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BOARD OF SCIENTIFIC COUNSELORS

SAFE PESTICIDES/SAFE PRODUCTS (SP2) SUBCOMMITTEE MEETING SUMMARY

U.S. Environmental Protection Agency (EPA)
Research Triangle Park, North Carolina
February 7-9, 2007

Wednesday, February 7, 2007

Welcome and Opening Remarks

Dr. Anna Harding, Oregon State University, Chair, Safe Pesticides/Safe Products (SP2) Subcommittee

Dr. Anna Harding, Chair of the Safe Pesticides/Safe Products (SP2) Subcommittee of the Board of Scientific Counselors (BOSC), called the meeting to order at 8:07 a.m. She welcomed everyone and thanked the Subcommittee members for their participation in the program review. Dr. Harding also thanked Dr. Elaine Francis, National Program Director (NPD), and her team as well as the scientists who contributed to the research and the organization of the meeting. She expressed her gratitude to Ms. Heather Drumm, the Designated Federal Officer (DFO) of the SP2 Subcommittee, for organizing all of the details and logistics of the review, helping the team to stay on track, and answering questions regarding the Federal Advisory Committee Act (FACA) process. This was the first in-person meeting of the Subcommittee members, whom Dr. Harding then introduced:

Dr. Jerry Ault—University of Miami
Dr. Carlos Blanco—Agricultural Research Service, U.S. Department of Agriculture (USDA)
Dr. Elly Best—U.S. Army Engineering Research and Development Center
Dr. Joel Coats—Iowa State University
Dr. P. Barry Ryan— Emory University, a member of the BOSC Executive Committee and Vice-Chair of the Subcommittee
Dr. Rich Di Giulio—Duke University
Dr. Judy Graham—American Chemistry Council
Dr. Craig Adams—University of Missouri–Rolla

Dr. Harding explained that the objective of the program review was to conduct a retrospective and prospective evaluation of the Office of Research and Development's (ORD) SP2 Research Program and assess the structure, relevance, quality, performance, and scientific leadership and communication and coordination aspects of the program. It is anticipated that the review will provide guidance to help ORD respond to various internal and external needs (e.g., making funding decisions and preparing reports for Congress).

The SP2 Subcommittee was formed last fall by the BOSC Executive Committee, which developed and approved charge questions to solicit comments on the program's relevance,

structure, performance, quality, outcomes, scientific leadership, and coordination and communication. Dr. Harding stated that the Subcommittee was asked to undertake the review and provide a draft report to the BOSC Executive Committee for review and approval at its next meeting in May. To address the charge questions, the Subcommittee chose to organize the review around the three long-term goals (LTGs) presented in the Multi-Year Plan (MYP). Thus, the Subcommittee commented and responded to the questions and factors noted in the first five charge questions relating to the program's relevance, structure, performance, quality, and outcomes for each LTG. The charge questions for scientific leadership, coordination, and communication were evaluated separately in relation to the overall program.

Dr. Harding explained that the review was piloting a new qualitative rating tool. Developed by a workgroup that included representatives of the BOSC, ORD, and the Office of Management and Budget (OMB), the tool rates the program quality and significance of the research and the extent to which the program is meeting or making measurable progress toward its goals. In advance of this review, the Subcommittee members had participated in one administrative call and two public conference calls to discuss the charge questions, background materials, writing responsibilities, and the format of the report.

Dr. Harding then reviewed the meeting agenda, which was modeled after previous BOSC program reviews. Day 1 began with introductory remarks by Ms. Drumm and Dr. Francis, followed by an overview of LTG 1 Subparts A and B given by Dr. William Mundy, Research Toxicologist, National Health and Environmental Effects Research Laboratory (NHEERL). A poster session and affiliated discussion period followed for LTG 1. The afternoon session began with an overview of LTG 1 Subpart C by Dr. Greg Sayles, Acting Associate Director, National Homeland Security Research Center (NHSRC), followed by a poster session discussion. The day concluded with a presentation by Mr. Jim Jones, Director, Office of Pesticide Programs (OPP), Office of Prevention, Pesticides, and Toxic Substances (OPPTS), on the OPP perspective of ORD's SP2 Research Program.

Day 2 included an overview of LTG 2 by Dr. Timothy Gleason, Branch Chief and Supervisory Research Biologist, NHEERL, ORD, and an overview of LTG 3 by Dr. Robert Frederick, Senior Scientist, National Center for Environmental Assessment (NCEA), ORD, with a poster session following each presentation. A discussion session for both LTGs 2 and 3 occurred in the same allotted time. The day included a presentation by Mr. Jim Willis, Director, Chemical Control Division, Office of Pollution Prevention and Toxics (OPPT), OPPTS. This was followed by a preliminary Subcommittee discussion of the assessment of LTG 1 using the new rating tool. In accordance with FACA, this day included a specific time for public comment.

Day 3 began with a preliminary discussion of the assessment of LTGs 2 and 3. The remainder of the day involved working time for the Subcommittee and included a debriefing that served as the Subcommittee's preliminary draft response to the charge questions.

Dr. Harding stated that the Subcommittee has a conference call scheduled for later in the month to assess the status of the report and to determine what still requires completion.

Dr. Graham noted that she would need to be recused from discussion of the developmental immunotoxicology research. She explained that she is in charge of the Long-Range Research Initiative for the American Chemistry Council and that NHEERL investigators won a

competition in which they were awarded $482,000 by the Council. The remaining funds were delivered in 2003, but the Cooperative Research and Development Agreement (CRADA) still is in effect and some of the work is continuing. Dr. Graham added that she also would need to recuse herself from discussion of the Agricultural Health Study (AHS). She was with ORD for 32 years and during the later stages of her career was involved with initiating that study.

Dr. Harding then asked Ms. Drumm to present her DFO Remarks.

DFO Remarks

Ms. Heather Drumm, DFO for the SP2 Subcommittee, ORD, EPA

Ms. Drumm thanked the participants for their attendance and then gave an overview of administrative procedures related to the meeting. She explained that the BOSC is a federal advisory committee that provides independent, scientific peer review and advice to ORD. The nine-member SP2 Subcommittee was established by the BOSC Executive Committee to review the SP2 Research Program. Specifically, the group has been asked to respond to charge questions and provide a report for the deliberation of the Executive Committee, which will review and revise it as required, and then present the report to ORD. Although the BOSC's role is to provide advice and recommendations to ORD, the rights of decision-making and program implementation remain with EPA. Ms. Drumm indicated that this was the Subcommittee's first face-to-face meeting. The Subcommittee has had three prior conference calls; one was administrative in nature and was held on December 15, 2006. The other two calls, which were open to the public, were held on January 17 and 29, 2007. A followup call will be held in March, and the date will be published in the *Federal Register*.

Ms. Drumm's role as DFO is to serve as the liaison between the Subcommittee and EPA and to ensure that the meetings comply with FACA requirements. Ms. Drumm provided a brief overview of the key FACA rules. FACA meetings, whether by phone, e-mail, or in person, must occur in a public forum when at least one-half of the Subcommittee members are in attendance. Documents received by the Subcommittee also must be made available to the public. Issues that are solely administrative or preparatory in nature are exempt from the FACA requirements. A *Federal Register* notice must announce all meeting dates 15 calendar days in advance. Notice for this meeting was published on December 8, 2006. The DFO must approve the agenda and attend all meetings. The meeting minutes will be certified by the Subcommittee Chair within 90 days of the meeting, after which they will be posted on the Web.

As DFO, Ms. Drumm also ensures that the Subcommittee members have satisfied all of the appropriate ethics requirements. Each of the members has filed a government financial disclosure report and has completed the required annual ethics training.

Ms. Drumm explained that, to comply with FACA requirements, it would be necessary to hold a discussion following each of the poster sessions to summarize the key points from the discussions between the Subcommittee members and EPA staff at each of the posters. She added that each poster was assigned two reviewers who will report highlights of each poster during the discussion time.

Ms. Drumm concluded by reminding the Subcommittee members to complete their reimbursement forms and submit them along with their travel vouchers, including original hotel

and car rental receipts, before the conclusion of the meeting on Day 3. She noted that the public comment time was slated for 4:00 p.m. on Thursday, February 8; comments are limited to 3 minutes per person. For the record, she reminded the participants to identify themselves prior to speaking. When she concluded her remarks, Ms. Drumm asked if there were any questions; none were posed.

Dr. Harding then welcomed the first speaker, Dr. Francis.

ORD Welcome

Dr. Elaine Francis, NPD, SP2 Research Program, National Center for Environmental Research (NCER), ORD, EPA

Dr. Francis thanked the participants for their attendance and then presented an overview of the SP2 Research Program. She began with a few introductory remarks, explaining that program reviews are critical to how ORD conducts its business. The reviews help to strengthen the programs and to lay out the strategic direction and investment over the next 5 years. The current review, she explained, is the tenth evaluation that the BOSC has conducted over the last 2 years. During her presentation, Dr. Francis stated that the purpose of the SP2 Research Program is: "to provide EPA's Office of Prevention, Pesticides, and Toxic Substances with the scientific information it needs to reduce or prevent unreasonable risks to humans, wildlife, and non-target plants from exposures to pesticides, toxic chemicals, and products of biotechnology."

Dr. Francis explained that the science needs for the SP2 Research Program fall under the fourth LTG of the EPA Strategic Plan, Healthy Communities and Ecosystems. When planning its research programs, ORD receives input from the program's main customers/users—with OPPTS being its largest client, outside peer advice, and the ORD Strategic Plan and other research plans. The products that result from the research are fed back into EPA's Strategic Plan, ORD's Strategic Plan, and to the users. ORD reports back to the committees/groups that provide advice, indicating how the program has responded to and addressed any recommendations that were made.

The SP2 Research Program was developed through consultation between ORD and OPPTS to determine areas of needed research. Dr. Francis pointed out that the program is evolving and that some of the posters being presented at this review cover research areas that have been completed; others represent areas of continued effort or cover new research areas. The SP2 MYP Planning Team is comprised of members from each laboratory and center in ORD as well as reviewers from the program and regional offices.

The program uses a range of research approaches and involves a number of research partners that cross divisions and national laboratories and centers, and integrates a range of research areas for human health, wildlife, and plants. Research under LTG 1 is focused on developing predictive tools and methods; LTG 2 is centered on wildlife risk assessment; and LTG 3 research is focused on biotechnology. The poster session for LTG 1 Subparts A and B included 22 posters; LTG 1 Subpart C featured 10 posters; LTG 2 involved 14 posters; and LTG 3 had 6 posters.

Dr. Francis provided budget details, mentioning that of the $29.6 million in SP2 Research Program funding from the FY2007 President's Budget, nearly one-half is allocated toward research under LTG 1, with $9.3 million channeled toward LTG 2, and $6.1 million directed at

LTG 3 research. LTG 1 also has the largest number of full-time equivalent (FTE) positions (42.7), followed by LTG 2 (36.9) and LTG 3 (8.5). The FY2008 President's Budget is slightly less, at a total of $28.2 million.

Dr. Francis concluded her introductory remarks by stating that the results of the program review are invaluable in helping ORD develop, implement, and plan the SP2 Research Program. She mentioned that presentations by the OPPTS Senior Managers, Mr. Jones and Mr. Willis, will cover the relevance of the SP2 Research Program and the application of its research in decision-making.

Dr. Francis then fielded questions from the participants.

Discussion

Dr. Adams asked why exposure is not identified as part of LTG 1 on slide 3, which shows exposure and treatment as one of the ORD research areas, considering it seems to be a major part of that goal. Dr. Francis responded that the exposure and treatment area is tied to the Spray Drift Research Program, a program that is no longer under ORD. She explained that ORD was in partnership for many years with OPP and industry on spray drift issues. Although ORD is no longer conducting research in this area, it remains a partner with OPP and industry on many ongoing activities. Dr. Adams asked for clarification that exposure drift is part of the research area of characterization and treatment (also listed on slide 3) through the Drinking Water Research Program. Dr. Francis confirmed that it is.

Dr. Francis informed the participants of the locations of the restrooms and cafeteria in the building. She also announced that an EPA Scientist group dinner would be held at 7:00 p.m. at the Symposium Café in Durham, NC.

Dr. Francis then introduced Dr. Mundy to provide an overview of LTG 1 Subparts A and B. Dr. Mundy received his Bachelor's degree from the University of Massachusetts in Environmental Sciences and his Master's and Doctoral degrees in Toxicology from the University of Kentucky. Dr. Mundy has been with EPA since 1990 as a Research Toxicologist in Research Triangle Park (RTP), NC, in NHEERL's Neurotoxicology Division.

LTG 1: Overview (Subparts A & B)
Dr. William Mundy, NHEERL, Research Toxicologist, ORD, EPA

Dr. Mundy outlined the main components of LTG 1, the framework used to organize the research projects, and the poster projects. He reviewed the three main ORD outputs for LTG 1, which are to: (1) provide methods and models for chemical screening and prioritization; (2) enhance interpretation of data from current tests and move towards targeted, hypothesis-driven testing; and (3) provide data on specific individual chemicals or classes of chemicals of high priority.

Dr. Mundy explained that OPPTS is in need of credible and timely scientific information to inform risk assessment decisions regarding the many industrial chemicals and pesticides that it regulates. To address the need for a sustainable risk assessment paradigm, ORD and OPPTS

have developed a strategic plan for LTG 1 research. The research challenge is to produce specific data that are essential to assess and manage risk.

The LTG 1 research builds on earlier work under the Safe Communities Research Program, complements ongoing research under other research programs (e.g., Human Health, Endocrine Disruptors, Computational Toxicology), and integrates intramural and extramural programs. Dr. Mundy outlined the framework for LTG 1 and the associated poster themes. Aligned with the three main ORD outputs, the research themes of focus for the posters were hazard characterization and management, enhanced data interpretation and targeted testing, and screening and prioritization. The first theme was covered by posters LTG 1-1 through 1-4 and involved the generation of chemical-specific data to aid in the implementation of the Food Quality Protection Act. The second theme involved posters LTG 1-5 through 1-9 and covered the sub-themes of existing guideline data, targeted testing, and biomarkers of effect. The final theme on screening and prioritization involved posters LTG 1-10 through 1-21 and focused on the development of methods and models. A final poster, LTG 1-0, covered how ORD research supports the risk assessment process.

Dr. Mundy concluded his presentation by inviting the participants to ask questions.

Discussion

Dr. Graham commended Dr. Mundy on his presentation and then asked a question regarding the 2015 Annual Performance Goal (APG) for LTG 1 (slide 2) which reads: "Develop and validate virtual chemical and alternative methods for risk-based prioritization and screening of chemicals." Dr. Graham noted that Dr. Mundy's presentation, as well as the reading material on LTG 1, provided ample information on developing methods but not much on validation. She asked where the validation information could be found. Dr. Mundy responded that much of the LTG 1 research is longer term, and prior to use in a regulatory setting, the research requires formal validation. He added that his presentation emphasized steps prior to those later stages. Dr. Graham noted that she had anticipated validation to be included, given that this point is stated as an APG. Dr. Graham pointed out that much was mentioned regarding risk-based prioritization (e.g., hazard-based screening); however, screening methods for exposure were not presented. Dr. Mundy responded that several projects are using new techniques for developing biomarkers of both exposure and effects. He also added that although most of the research presented on Day 1 was focused on hazard characterization, some work did examine biomarkers of exposure.

Dr. Ault noted that the work described involves a considerable amount of computation language and asked if it relates to modeling activity or creating probability profiles. Dr. Mundy responded that the research is addressing computational tools such as *in silico* models to make predictions on exposure, pathogens, toxic metabolites, or adverse effects. He added that work also is underway for analytical methods to handle new types of research (e.g., "omics" studies). Additional research involves developing models and tools to manage the large data sets produced from high-throughput testing.

Dr. Mundy concluded by thanking the participants and inviting them to the poster session. Dr. Harding noted that each primary and secondary reviewer was given 15 minutes per poster.

Poster Session Discussion: LTG 1 Subparts A & B

Dr. Harding asked Dr. Graham to lead off the Subcommittee's poster session discussion. Dr. Graham began by stating that the poster presentations were very clear and that the individual presenters were quite knowledgeable. In several of the cases, despite the projects being the work of several collaborators, the presenter was familiar with the entire project. Dr. Graham observed that a common theme throughout several of the posters was the integration of research from various laboratories and divisions, as well as the involvement of OPP. She noted that this type of cross-disciplinary work is rare.

Dr. Adams commented that he was very impressed with the quality of the research and its structure and organization. One concern, however, is that much more toxicology than exposure work is represented. For instance, little research is underway on chemical exposures in food and water. He learned from the poster session that information is available through the registrant process, which might explain why there were few exposure-related projects at this session. Dr. Adams added that exposure data should be available through the registrant process or other channels; if not, ORD must ensure that projects incorporate that aspect. He noted that the exposure work might be lagging behind the research on toxics, but suggested that it would be better to investigate those areas in parallel.

Dr. Graham also expressed concern that exposure work is not being addressed sufficiently. Although there is excellent research in the biomarkers area, dose response data ultimately will be required. One limitation for exposure studies is their elevated cost, which can run into millions of dollars. It might cost $20,000 to study one family, but the sample size would be one. Dr. Ryan agreed that minimal exposure work was represented. He added that the SP2 Research Program should have a greater emphasis on screening tools. It would be helpful, he proposed, if 80 percent of the large number of screening tools available could be eliminated.

Regarding validation, Dr. Adams observed that many tests and models are being developed, and each one is case specific. He suggested that the leaders of these projects and ORD should emphasize to the investigators that the models require validation and that they should be reproducible and accurate. The tests and models have errors associated with them and the limits of those tests and models should be determined. Dr. Adams suggested that it would be helpful when the Subcommittee prepares its reports and evaluations to have a listing of the peer-reviewed publications under each LTG; at the moment, the only sources of information available are the posters, abstracts, and conversations with the investigators.

Dr. Ault was very impressed with the posters and the abstracts that he viewed. He observed a broad range of participation outside EPA as well as collaborations between EPA and academia. The Carolina Environmental Bioinformatics Research Center (poster LTG 1-15), which is addressing many complex statistical problems with large data sets, is one project involving a range of partners. He added that the work with the ECOTOX database and Assessment Tools for the Evaluation of Risk (ASTER) system (poster LTG 1-18) is quite impressive; they are bringing scientific and technical information together and are screening the information to learn the value of the data. On the other hand, Dr. Ault added, he had difficulty observing clear identifiable linkages to risk assessment in relation to the larger program goals. In his view, there needs to be greater quantification of the empirical data. Dr. Ault added that he finds it difficult to view the

projects and know what FTEs and funding are associated with the work. More information is needed because a project with a minimal budget might have minimized future activity.

Dr. Graham commented that it would be useful to have Dr. Francis explain whether it would be feasible to obtain a figure for cost per publication. Dr. Ryan responded that having cost per publication may not be a fair assessment because some research costs are more than others. Dr. Harding stated that it is an important issue to know how many resources are devoted to certain research areas; however, it is not possible to obtain that level of detail. Dr. Harding asked Dr. Francis to provide clarification on the budget breakdown per LTG.

Dr. Francis commented that the lowest budget breakdown that ORD can provide is at the LTG level. She explained that many of the research projects have long histories in which resources have been allocated to the highest research priorities over the years. For example, funding was provided in 2003 to build the LTG 3 biotechnology program. The other programs were continuations of ongoing efforts in which research expertise was matched with the highest priority needs. Several of the PIs are working across research programs, so the division of funding per project level is not made. Moreover, the work of each poster typically is an integration of several projects. For cases in which some of the work has ended, those resources have been transferred to the next highest priority research.

Dr. Graham commented that she was impressed by how the ASTER system (poster LTG 1-18) is being updated every 3 or 4 months. Also impressive, she added, is that the database has a user support group.

Dr. Best mentioned that she was very impressed by the role of the Science To Achieve Results (STAR) Computational Toxicology Program (poster LTG 1-14). She pointed out that the research funded under this program is very productive, with testing methods focused mainly on collecting large data sets and emphasis on finding mathematical approaches to data management. Dr. Graham added that there are many Centers among the STAR Programs and that Centers are valuable because they can involve a variety of expertise to tackle a project. Also beneficial is that some of the projects have been changed into cooperative agreements, which permit cross-disciplinary overlap between experts.

Dr. Coats commented that he was impressed by the predictive value of a number of the new tools. He added that the work is of high quality, holds much potential, and that no other investigators in the United States or globally are conducting this type of toxicology research.

Dr. Harding asked Dr. Francis to provide clarification on the issue of exposure research.

Dr. Francis responded that some of the SP2 Research Program work is leveraged with the research of other ORD programs. For instance, the Human Health Research Program has a stronger group working on exposure methodology that would have applicability to OPPTS and other program offices. Because EPA obtains much information from the registrants on exposures, the registrants do not necessarily request exposure research from EPA. Registrants have, however, asked EPA for research on the impact of drinking water treatment on pesticides, and the Agency is working in that particular area because the registrants could not obtain that information elsewhere. Dr. Francis added that OPPTS is one of EPA's largest bodies of risk assessors with approximately 600 risk assessors. Unlike some of the other offices that do not

have any or many scientists and must rely on ORD for risk assessments, OPPTS has its own scientists to conduct these evaluations.

Dr. Graham commented that ORD has orchestrated the SP2 Research Program to ensure that method development under the Human Health Research Program or the Endocrine Disruptors Research Program also is applicable to the SP2 endeavors. She asked if the BOSC Executive Committee works to ensure that resources are balanced appropriately among the programs, both in terms of funds and also for areas of coverage.

Dr. Harding responded that she is uncertain whether the larger picture has been addressed. At each meeting, the Executive Committee will examine the overall direction of ORD and the strategic direction of the program. Dr. Graham commented that because resources are changing over time, it would be helpful to have a complete picture of the funding/resource allocation. She added that certain research areas are missing because of a lack of resources.

In regards to the issue of exposure work, Dr. Adams asked whether there has been a coordinated analysis of the existing exposure levels and what data gaps exist with respect to exposure, routes, and chemicals for different populations. There might be registrant and other exposure data available, but has there been any effort to coordinate that data, address its quality, and look for gaps? Dr. Francis replied that she does not have the answer but welcomed one of the representatives from the National Exposure Research Laboratory (NERL) or OPP to respond.

Dr. Kathleen Raffaele, Health Effects Division, OPP, stated that OPP does both chemical-by-chemical and accumulative assessments. Where gaps exist, OPP seeks data from registrants. She added that input from NERL is used for model development.

Dr. Steve Bradbury, Director, Environmental Fate and Effects Division, OPP, explained that there is not much information under LTG 1 on a given structure or group of structures. For research on conventional pesticides, baseline information (e.g., half-life, rate constants) about the structure(s) is being collected. One of the major challenges for exposure is related to metabolites; specifically, keeping track of degradation and metabolic pathways as well as examining compounds and metabolic patterns. Dr. Bradbury added that only two or three of the posters addressed this topic as it relates to information technology and predictive techniques. He noted that there is more exposure research under LTG 2 that is past the screening stage and in a higher tier of risk assessment.

Dr. Harding asked the Subcommittee members whether more information would be required from the investigators present regarding the outputs of their activities. Dr. Graham responded that she is fine with the current amount of information; however, the Subcommittee might recommend that bibliographies for future Subcommittee meetings include a timeline of the projects. Dr. Harding agreed, adding that some of the products of the work are so new that they have not yet resulted in any publications.

Dr. Graham recalled that one of the action items from the January 29, 2007, conference call was that Dr. Francis would provide the Subcommittee with a listing of peer reviews pertaining to the SP2 Research Program. She added that from the poster session she learned that the Neurotoxicology Division has entered a second divisional peer review. Will the Subcommittee hear about

other peer reviews during this meeting? Dr. Francis responded that a more complete list of the peer reviews was compiled and it will be distributed later in the meeting.

Dr. Harding adjourned the meeting for lunch at 12:00 p.m. Subcommittee working time followed at 12:30 p.m.

Working Lunch

Dr. Harding commented that recurring issues (e.g., exposure work) that are not resolved at this meeting still will be written up and recommendations will be made. She reminded the Subcommittee members to use the rating tool during their assessments. Dr. Harding also reminded the group that she is preparing the section on leadership and that she will need to hear from all of the workgroups regarding details of leadership in the program as they pertain to the LTGs. Dr. Harding will receive information on the aspects of coordination and communication from Dr. Ryan.

Dr. Graham suggested that the Subcommittee members might want to review the rating criteria on page 7 of the draft charge to ensure that any unanswered questions regarding the tool are addressed. She noted that answers to some of the questions might not be available currently.

Dr. Di Giulio pointed out that publications emerging from research conducted under the SP2 Research Program clearly are affiliated with ORD, but wondered whether their link to the SP2 Research Program specifically is apparent.

Dr. Harding responded that this is a relevant question and that people during the meeting will speak to details of the SP2 Research Program. She added that there also is collaboration between the researchers about how the results are communicated beyond the regional offices.
Dr. Graham stated that Dr. Francis is knowledgeable about this information exchange, more so than many of the NHEERL staff, so it would be a good topic to address. Dr. Harding agreed.

Dr. Coats asked if the rewards system under which the scientists work places similar weight on the utility and collaboration of the tools they develop as it does on publishing in the scientific literature. He also asked how cases are assessed for which research was not yet published but should have been, and whether that work had application value. Dr. Harding replied that it is an application-driven system, with scientists responding to OPPTS and its needs.

Dr. Graham noted that Day 2's session would include speakers from OPPTS. She suggested that Dr. Francis speak to the question regarding the rewards system and that any Laboratory Directors present also could respond. Dr. Harding replied that OPPTS uses a different structure for deciding which research areas to focus than what many of the Subcommittee members are accustomed to in a university setting, where individual researchers decide on the focus.

Dr. Ault commented that in reviewing the materials he noted an important number of awards. It was difficult to determine, however, what level of publication productivity merits an award. He suggested that internal criteria are required to assess merit. Dr. Graham responded that internal scales are used to assess award merit. Dr. Harding added that the meaning of the award medal types was not clear to her.

Dr. Adams commented that the level of publications produced by ORD likely could be evaluated. Dr. Graham noted that the bibliographies are not partitioned according to LTG. Dr. Adams pointed out that it is not the number of publications that counts when assessing the peer-reviewed publications; what counts is the information that needs to be communicated. According to him, peer review is the only way to ensure the quality of the research. Dr. Adams agreed with Dr. Coats that it also is important to note the impact of the publications. Dr. Best pointed out that the bibliographic analysis is addressing those needs. Dr. Graham stated that these questions could be posed to the program office during Day 2 and that the OPPTS speakers also could speak to what information they use during their reviews.

Dr. Francis praised the morning session of Day 1 as a successful start to the current program review. She then introduced the next speaker, Dr. Sayles, and provided a brief biography. Dr. Sayles has degrees in Chemical Engineering at the undergraduate level from the California Institute of Technology, an M.S. from the University of California–Davis, and a Ph.D. from North Carolina State University. He joined EPA's National Risk Management Research Laboratory (NRMRL) in 1990 as a Research Chemical Engineer. From 2002-05, he served as Acting Assistant Laboratory Director and then, from 2005 to present, as Assistant Laboratory Director for Drinking Water, Pesticides and Toxics, and Endocrine Disrupting Chemicals. He served as the Acting National Program Director for the Drinking Water Research Program from 2005-06. Dr. Sayles became the Acting Associate Director for NHSRC at the end of 2006.

LTG 1: Overview (Subpart C)
Dr. Greg Sayles, Acting Associate Director, NHSRC, ORD, EPA

Dr. Sayles began his overview of LTG 1 Subpart C by mentioning that this part of LTG 1 attempts to be the most responsive to the client needs by working with them to design the research and the products. The research being undertaken can be organized into two categories: perfluorinated compounds (PFC) research that is addressing an APG to be met by 2013 (posters LTG 1-22 through 1-27) and non-PFCs research addressing an APG to be met by 2010 (posters LTG 1-28 through 1-31).

Designed in collaboration with OPPTS, ORD research supported the Scientific Advisory Board (SAB) review of the risk assessment and the development and implementation of the Enforceable Consent Agreement (ECA) with industry. In particular, the research is examining two main questions: (1) What are the areas of uncertainty associated with the toxicology of perfluorooctanoic acid (PFOA)? (2) What are the primary sources and pathways of human and environmental exposures to PFOA and related compounds? ORD is addressing these questions via toxicity and pharmacokinetics (PK) research—through studies on mode of action and the development of PK models for extrapolating animal data to humans for PFOA. The work also is examining source and exposure pathways and includes the development of sampling/analytical methods and models for analyzing PFCs in biological and environmental samples, as well as determining the PFOA content of consumer products.

The non-PFCs research is addressing the following questions: (1) What protocols are needed to determine the impact of drinking water treatment processes on pesticides? (2) What exposure tools are needed to support large-scale human exposure/epidemiological studies? (3) To what extent do deck coatings and sealants reduce dislodgeable residues on the surfaces of chromated copper arsenate (CCA)-treated wood? (4) What tools are available to characterize human

exposures and risks to asbestos? Studies addressing the first question include research to develop protocols for estimating pesticide removal and research conducting drinking water treatment studies on six carbamate pesticides. Research for question 2 includes the AHS Pesticide Exposure Study, which is characterizing farm worker and family exposures and exposure factors. Question 3 research includes a model to estimate absorption levels of arsenic and chromium from CCA in children. The fourth question includes research that is evaluating methods for characterizing air exposures.

Dr. Sayles concluded by stating that ORD research under LTG 1 C is: responsive/flexible to address emerging and high-priority needs; collaborative in scope, design, and implementation; and results oriented, with products used by EPA risk managers and the regulated community to support registrations and risk assessments and to reduce risks. Dr. Sayles then welcomed questions from the participants.

Discussion

Dr. Harding asked for clarification on whether ORD research that was discussed was pertaining specifically to the SP2 Research Program or to other parts of ORD. Dr. Sayles responded that all of the research he discussed pertained to SP2 work under LTG 1. Dr. Harding again asked for clarification on which body was requesting research from ORD. Dr. Sayles stated that requests for research come mainly from OPPTS. Again in response to Dr. Harding, Dr. Sayles stated that he would rather defer to one of the poster presenters and/or to an OPPTS representative to offer more information on the ECA process.

Ms. Cathy Fehrenbacher, Chief, Exposure Assessment Branch, OPPT, explained that the ECA process was a voluntary process that was initiated several years ago to understand the sources and pathways of PFOA in the environment. OPPT issued a *Federal Register* notice to convene a couple of meetings to engage parties interested in generating data on the topic. Ms. Fehrenbacher stated that some ECAs are in place and that there are some Memorandums of Understanding with industry. She added that ORD scientists worked with OPPT to ensure that the data generated were based on sound science and the most appropriate analytical methods.

Dr. Harding commented that the ECA appears to be a requirement. Ms. Fehrenbacher responded that the ECA is an agreement between the Agency and, in the given example, a company for which OPPT identified specific tests for incineration. The goal was to understand better the degradation of certain compounds during incineration. She reiterated that the ECA is an enforceable mechanism that was implemented as a voluntary process in an open, public manner.

Dr. Graham asked if it would be possible to look at research accomplished, perhaps 5 or 10 years down the line when project goals are to have been met, and know if it would represent the complete package of information that is needed or that something is missing. According to Dr. Sayles, the client would help to determine if a suitable assemblage of information has been collected. He added that ORD responds to high-priority gaps in research that have been identified, but deferred this question to the program office.

Dr. Jennifer Seed, Chief, Existing Chemicals Assessment Branch, OPPT, explained that the risk assessment process is more sophisticated with the PFOA class of compounds than usually is the case because these compounds have a very long half-life in humans. Thus, the typical risk

assessment process is not followed. She added that it is fortunate that human biomonitoring data are available. Specifically, the assessment uses internal dosimetric approaches from humans and animals. Much of the research is emerging from the PK and the toxicology work. Dr. Seed explained that when the research was begun, there was no means by which to mitigate risk. A second arm of the research aims to produce a more specialized risk assessment to determine which pathways are more important in producing certain human exposures. Trying to engage industry in this work is difficult, but doing so using the ECA process has proved successful because it provides an enforceable mechanism. In relation to Dr. Graham's question on forecasting satisfaction to research results in a few years' time, Dr. Seed stated that it will be possible to do this on the risk assessment side. On the exposure and risk mitigation sides, it is hoped that successful forecasting will be possible.

Dr. Harding confirmed that there were no other questions and then thanked Dr. Sayles for his presentation. She asked Dr. Coats for any introductory comments to the poster session for LTG 1 Subpart C. Dr. Coats commented that the posters for Subpart C appear to be one concerted effort on the PFCs, with a few projects having stand-alone themes. He emphasized that the point is to evaluate the science at hand, despite any discontinuity in topics.

Dr. Harding concluded by reminding the Subcommittee members that they had 15 minutes per poster and then asked everyone to reconvene at 3:00 p.m.

LTG 1 Poster Session II Discussion

Dr. Coats began the discussion by listing some of the poster topics covered in this session. These topics included risk assessment and reducing exposure for children in contact with CCA-treated wood (poster LTG 1-30); the fate of pesticides during drinking water treatment (poster LTG 1-28); and work on fluorinated compounds and their potential and known effects, including toxicokinetics work (posters LTG 1-23 through 1-27). The posters he reviewed all appear to have a good intent. Moreover, they involve solid collaborations, are strongly focused, and are fulfilling immediate needs and providing answers.

Dr. Ault agreed that the projects all have strong collaborations and coordination in tying effects to exposure scenarios. He stated that the work on PFOA effects is excellent and commended the study on asbestos (poster LTG 1-31) for being well done and well coordinated.

Dr. Graham stated that she was very impressed with the level of close collaborations with the program office as this degree of collaboration has not always happened in the past. She noted that one individual mentioned that he has a working group in place to ensure that people from different disciplines are on the same track. She commented that the work of poster LTG 1-23 is examining blood levels in relation to the effects of perfluoroalkyl acids, adding that this type of work is rare and provides new means of addressing traditional questions.

Dr. Best stated that she also was very impressed with the PFOA work. It is important to address the characteristics of compounds in humans and natural systems, she added, in addition to the current work on pathway analysis.

Dr. Ryan commended the communication that is happening in relation to the PFOA research. In speaking with an investigator regarding the PFOA pathway work, he learned that the state had

asked the regional office about this research, and that office then asked ORD to examine PFOA and look for methods to identify the material in blood and environmental samples and examine ways to measure effects.

Dr. Adams stated that he was very impressed with the PFOA and perfluorooctane sulfonate (PFOS) studies; this research developed methods in very difficult matrices and involved strong collaborative mechanisms.

Dr. Harding commented that the poster on ORD's support of the AHS (poster LTG 1-29) exemplifies research in which the SP2 Research Program has found its niche, which is to address the issue of exposures. Providing that information, she added, will better inform epidemiological analyses made by the National Cancer Institute and the National Institute of Environmental Health Sciences (NIEHS).

Dr. Coats stated that he found the poster on the AHS work valuable because there has been so much conjecture over the past 30 years on ag-health and ag-chemical effects on workers, yet previous studies had been retrospective analyses, not exposure studies to examine the epidemiology. He added that the work also involved the National Institute for Occupational Safety and Health (NIOSH).

Dr. Ault asked what constitutes the standards for the EPA awards system. Dr. Harding invited ORD representatives and the program office to respond.

Dr. Francis explained that the awards system has clear criteria that must be met. To receive a gold medal, the research must make a significant contribution that has cross-cutting applications—EPA-wide and beyond. About 10 or 15 gold medals are handed out each year across EPA. To merit a silver medal, the research also must be significant across the Agency in some way, but with less of an immediate impact than for the gold medal. The bronze medals usually are handed out within an Assistant Administratorship, and are more readily awarded than the silver and gold medals. Dr. Francis added that external panels review the proposals for the awards at all three medal levels. The awards often are granted to teams and across the organization. For example, bronze medals have been awarded for joint efforts between OPPT and ORD.

In response to Dr. Harding's question, Dr. Francis stated that nominations are required for the awards; either the office or Laboratory Director makes the nomination of an individual or team. Dr. Hal Zenick, Associate Director–Health, NHEERL, added that a high level of response and impact are required of research to receive a gold or silver medal. For example, the Cancer Assessment Guidelines received a gold medal, as did research in response to Hurricane Katrina.

Dr. Francis mentioned that EPA's Scientific and Technological Achievement Awards (STAA) Program also has a high threshold of achievement. The STAA awards, which are granted and announced at EPA's science forum each year, are based on publications and EPA's SAB decides which papers receive an award. These awards have different levels (1, 2, 3, honorable mention), with more awards being granted at each subsequent lower level and the top level, 1, granted to research with the broadest impact. Dr. Francis added that the STAA awards require projects to have well-defined proposals and meet particular criteria. Dr. Ault asked what the lag time is to determine the impact of a paper. Dr. Francis responded that a paper can be considered for a

STAA award if it was published within the last 3 years.

Dr. Di Giulio stated that he was pleased with the science that was presented. He asked why EPA selected certain chemicals and classes of compounds for the SP2 research. He added that particular chemicals such as fire retardants also would be of interest for safety concerns.

Dr. Seed responded that PFOA was brought to OPPT's attention in an urgent manner. The compound is present in human blood and toxicological studies showed dramatic effects at very low levels; however, there was a lack of information about the sources and pathways of human exposure. ORD immediately launched research efforts to fill these data gaps. Additional information has been collected since 2000 through EPA's Voluntary Children's Chemical Evaluation Program. Dr. Francis added that work on PFOA for the SP2 research provided a close tie to the programmatic review because it involved specific research, as opposed to the core research program work. She explained that EPA had to look at areas of research in which EPA already had information and expertise to address an issue versus those areas in which resources were lacking. She added that information also is coming from research on brominated fire retardants; new questions have emerged from that work.

Dr. Graham asked about including more information about future research areas, such as work on prions and nanotechnology, which are mentioned only briefly in the SP2 MYP.

Dr. Francis responded that the MYP includes mention of work on prions and nanotechnology as examples. She explained that EPA was in the rare position of receiving an extra $4.5 million in FY2006 with the attached stipulation to use those funds as a 1-year amount of funding to address high-level areas of problem-driven research. Thus, ORD and OPPTS scientists determined what high-priority issues should be addressed. Dr. Francis noted that much of the work that was presented during today's meeting resulted from that 1 year of research. Some of that funding was put toward the computational toxicology areas.

Dr. Francis mentioned that EPA has been increasing its research efforts in nanotechnology over the last 2 years. Since 2000, the Agency has had an extramural grants program; for its first 2 years, Requests for Applications (RFAs) were issued on nanotechnology applications. More recently, the focus has shifted to the implications of nanotechnology. Joint RFAs with other agencies also have been issued and an intramural nanotechnology program has been established. The Agency also has a team of scientists working internally to develop a nanotechnology strategy. Dr. Francis added that the nanotechnology research is being planned outside any of the existing MYPs. This is a common procedure for new programs that are outside the context of the current research structure and that later find a place within one of the MYPs. For example, the biotechnology team now is under the SP2 Research Program. She noted that the nanotechnology program is of interest to other offices in the Agency in addition to ORD and OPPTS, and it is not yet clear whether the program will remain integrated or if it will be distributed among the existing programs.

Dr. Coats asked whether the projects under LTG 1 Subpart C represent the whole of the special requests research or if they are a sampling of those projects. Dr. Francis responded that the work represents the majority of the research that currently is underway. The lead-based kits research was not included, she added, but it represents a small component relative to everything else.

Dr. Coats then asked about the likelihood of establishing an exploratory research program in nanotechnology in the future. Dr. Francis responded that the exploratory program originally was granted $10 million; the STAR grants program shifted $5 million of that total to nanotechnology. She added that the program was either not funded or received fewer funds over the last few years. Even when the exploratory program was broader, however, it never was completely exploratory. For instance, the categories of exposure methodology and analytical chemical tools were much broader than the targeted RFAs.

Dr. Harding suggested that Mr. Jones' presentation be moved ahead of the Subcommittee working time.

Dr. Francis then introduced Mr. Jones as the next speaker. Mr. Jones has worked in EPA for more than 20 years in various capacities but focused mostly on OPPTS issues. Currently the Office Director of OPP, Mr. Jones has been in OPP for more than 12 years at different managerial levels. Mr. Jones spoke about OPP's perspective on the research that ORD conducts and how OPP has used that information in decision-making.

OPP Perspective of ORD's SP2 Research
Mr. Jim Jones, Director, OPP, ORD, EPA

Mr. Jones introduced himself and mentioned that several scientists who have worked collaboratively with colleagues at ORD and the Pesticide Program were in attendance at this program evaluation. Mr. Jones began with an overview of the National Pesticide Program mission, which is to provide the "best possible regulatory decisions to protect public health, non-target species, and the environment" and to "rely on all available and relevant scientifically sound information."

According to Mr. Jones, the National Pesticide Program manages and reviews new pesticides and reevaluates existing pesticides on regular statutory schedules; more than 5,000 regulatory decisions are made annually. Currently, the pesticide market contains approximately 1,100 active ingredients and 19,000 products (e.g., agricultural pesticides, antimicrobial and consumer products, and inert ingredients). Data on the inert ingredients are limited, whereas there is an abundance of data on agricultural chemicals.

The three LTGs under the SP2 MYP are aligned with OPP's research needs. OPP and ORD have a common vision for the future, which is to develop a hypothesis-driven research program. LTG 1 research will help OPP move toward an integrated toxicology testing and assessment paradigm. Mr. Jones noted that many of the posters for LTG 1 demonstrate potential applications of work to advance the program and to help inform current regulatory decision-making. Examples of ORD projects that have contributed to OPP's risk assessment process include work to improve interpretation of developmental neurotoxicity (DNT) guideline data, targeted testing for DNT based on thyroid disruption, and work on ASTER.

Mr. Jones explained that the current toxicology testing paradigm involves extensive hazard testing and generates *in vivo* animal data for all possible adverse outcomes to determine which of all possible effects are relevant. In an attempt to move toward a more efficient means of assessment, the new hypothesis-driven paradigm will use *in silico* models and *in vitro* data, along with estimates of exposure, to determine what specific *in vivo* tests are necessary.

Regarding LTG 2, Mr. Jones commented that the work will assist OPP in advancing approaches for assessing spatially explicit population-level risk to wildlife and non-target plants. This work will include probabilistic methods to assess the magnitude and probability of effects and exposures. Other risk management issues of concern include examining the access to and interpretation of ecotoxicological effects—the ECOTOX database and registrant-submitted data are critical to this work—and addressing issues of ecological relevancy, such as determining how long it would take for population-level effects to occur.

Mr. Jones mentioned that OPP soon will be launching its Bulletins Live! Web Site for endangered species protection. This system will relay geographically specific pesticide use limitations when needed to protect listed species or their designated critical habitat.

For LTG 3, there are four areas of biotechnology and pesticide context on which OPP is focused: (1) enhancing methods to assess allergenicity; (2) improving methods to determine the impacts of plant-incorporated protectants (PIPs) on non-target species; (3) providing a model to estimate gene flow and potential impact; and (4) improving methods to detect insect resistance to *Bacillus thuringiensis* (Bt) proteins. To date, all PIPs are derived from either Bt or plant viruses. EPA regulates PIPs that are produced via modern biotechnology techniques.

Mr. Jones concluded by mentioning that spatially and temporally explicit risk assessments and management decisions are central to human health and environmental outcomes. The posters demonstrated well the connection between the work in ORD and the problems that OPP has had.

Discussion

Dr. Ryan asked how the SP2 Research Program and ORD in general communicate the outcomes of their research to other parts of the Agency and to the community as a whole. Mr. Jones responded that most of the communication occurs at the operational level, where science dialogue takes place. He explained that it is unusual for an OPP scientist to not speak of the research that has been learned from ORD. The communication also is occurring at the managerial level. Mr. Jones added that he makes an effort to visit the EPA laboratories at RTP, NC; likewise, the Office Directors from RTP, NC, visit the EPA laboratories in Washington, DC, to keep dialogue alive on how to achieve research objectives.

Dr. Ryan asked about the communication across agencies such as NIOSH. Mr. Jones answered that researchers from ORD typically are engaging with NIOSH, NIEHS, and other parts of the broader scientific community.

Dr. Blanco asked how OPP can anticipate regulatory and research needs, including those related to the products emerging from LTG 3 research on biotechnology. Tests currently are being developed for products that exist, but what about tests for future products about which industry is not willing to divulge much information? Mr. Jones responded that one way to obtain more information is to establish good relationships with the scientists conducting core research in plant biotechnology. OPP is constantly in discussions with companies to learn their plans. Mr. Jones explained that the earlier the companies release information about novel chemistries, the earlier OPP can evaluate them. This release of information should happen well in advance of the chemical being submitted to EPA for approval.

Dr. Ault asked who, the government or industry, bears the cost of either a positively or negatively regulated product. Mr. Jones responded that the entire world bears that cost, adding that 99 percent of the product testing is conducted by the manufacturers. Regarding innovations that likely are to occur, Dr. Ault commented that information should be released beforehand to accommodate their arrival. Mr. Jones concurred with this statement, adding that the manufacturer loses out if that information is not released.

Dr. Harding noted that this program review has not included speakers from any of the regional offices to discuss the applications of the research findings. She asked whether there is any systematic way of obtaining information from the regional or tribal offices. Mr. Jones responded that unlike programs such as the Superfund Program, Water Program, or Air Program, where action occurs at the regional offices, the Pesticide Program largely is a headquarter-centered operation. The goal of the Pesticide Program is to have one licensing authority deal with regulatory decision-making. At the regional level, the programs provide enforcement for areas in which the states do not take the lead. The regional role also involves the management of state grants.

Dr. Graham asked whether OPP considers ORD's research crucial to its own work. Mr. Jones responded that OPP's work on dozens of pesticides over the last 5 years could not have occurred without support from ORD. He added that ORD needs to build research that is stepwise such that each enhancement further improves the results; this approach is better than just assisting OPP with decision-making.

The meeting adjourned at 4:30 p.m.

Thursday, February 8, 2007

Review of Yesterday's Activities and Overview of Agenda
Dr. Anna Harding, Oregon State University, Chair, SP2 Subcommittee

Dr. Harding began with a brief overview of Day 1 and the agenda for Day 2. She mentioned that Day 1 involved interesting presentations and a good poster session for the work under LTG 1. The Day 2 session would cover research being conducted under LTGs 2 and 3. Day 2 began with an overview of LTG 2 by Dr. Gleason, followed by a poster session. Dr. Frederick spoke next, giving an overview of LTG 3, followed by the affiliated poster session. The poster session discussion for both LTGs 2 and 3 occurred after lunch. The afternoon included a presentation by Dr. Willis, followed by Subcommittee working time. This day also included time for public comment.

Dr. Graham asked how ORD decides to balance Subparts A and B versus Subpart C (i.e., the long-term versus short-term goals). She also asked a question in reference to a document on potential long-term and annual measures that the Subcommittee members had received in preparation for the January 29, 2007, conference call. She inquired about the reason behind the relatively lower percent of APMs completed in 2004 for LTG 1 (67%) relative to the other years. In addition, Dr. Graham asked about the status of the division-level peer reviews for NERL.

Regarding balancing the research, Dr. Francis responded that ORD's commitment is to the longer term research, which historically has been given more priority. The Agency has shifted resources to meet shorter term needs when those have arisen. At times, when there have been

insufficient funds to address shorter term needs, OPPTS has stepped in to help ORD fund that work. Although ORD aims to act strategically, emerging issues arise all the time. Thus, ORD must decide in which areas of longer term research to stop or delay research to address shorter term needs. Dr. Francis noted that these decisions are made closely with OPPTS. Regarding the lower percentage of milestones met for 2004, Dr. Francis pointed out that milestones were not met on time as anticipated mainly because of PI retirement or illness.

In relation to the peer reviews, Dr. Ross Highsmith, Assistant Laboratory Director, NERL, explained that NERL implemented two divisional peer reviews last year; another division review is scheduled for August 2007. He added that the Air Program is undergoing implementation planning for several divisions, and that the SP2 Research Program will start this planning this year. The divisions that have undergone peer review are not part of the SP2 Program, so they were not included in the list of divisional reviews.

Dr. Ault asked if there is any way to anticipate emerging issues on which ORD might consult with OPPTS or industry. Dr. Francis responded that Mr. Jones explained well how OPPTS makes decisions and sets priorities and that OPPTS works closely with the regulatory authority to determine what is on the horizon. ORD also keeps its focus on the horizon. If new funding was received, ORD likely would address some of the products of biotechnology dealing with the non-agricultural work; for instance, the insertion of luminescent genes as markers and dyes. Dr. Francis explained that ORD works closely with industry to try to identify which products will hit the market. ORD also attempts to identify regulations that might emerge in the next few years. She gave the example of lead-based paint test kits; ORD evaluated some of the existing kits to determine their reliability in detecting the presence of lead. This work helped the program office to ensure that some of the underlying science supported data provided by industry.

Dr. Harding mentioned a question from Day 1 about whether the publications listed in the bibliography of the program review binder represent the SP2 Research Program or publications that might overlap with other programs (e.g., Human Health Research Program). Dr. Francis responded that the italicized publications were leveraged with other research programs; the ones in boldface were submitted or are "in press" and the complete citation was not available. She added that many of ORD's intramural PIs work on a number of MYPs; thus, overlap of bibliographies among the programs is not unusual.

Dr. Harding stated that a question to consider for Day 2 is whether the SP2 Research Program is advancing the current state of the science. She added that the discussions also should provide information for Dr. Ryan to prepare his writing assignment on the communication of the results.

Dr. Harding confirmed that there were no other questions. Dr. Francis then introduced Dr. Gleason as the next speaker. Dr. Gleason has a Bachelor's degree in Biology from Bates College, a Master's degree in Fisheries from the University of Rhode Island, and a doctorate in Biology from the University of Rhode Island. Dr. Gleason joined EPA in 1995 as a Research Biologist in the Atlantic Ecology Division. From 2001-02, he was the Acting Assistant Laboratory Director for Toxics and Pesticides. Since 2000, Dr. Gleason has been the Branch Chief and Supervisory Research Biologist with the Atlantic Ecology Division.

LTG 2: Overview

Dr. Timothy Gleason, Branch Chief and Supervisory Research Biologist, NHEERL, ORD, EPA

Dr. Gleason began his overview of LTG 2 by mentioning that the SP2 Research Program was created to be responsive to the program office. Research under LTG 2 is addressing two main OPPTS research needs: (1) supporting baseline ecological risk assessment; and (2) supporting refined ecological risk assessment to address the magnitude and probability of risk and assessing risks to populations of non-target organisms.

The strategic approach for LTG 2 drew on the Wildlife Research Strategy, with the goal of developing tools to assess risk to populations of wildlife and aquatic organisms from multiple stressors simultaneously. The Strategy was developed, Dr. Gleason explained, to meet needs across the Agency, including the Office of Water (OW) and the Office of Solid Waste and Emergency Response (OSWER), in addition to those of OPPTS through the SP2 Research Program. The three facets of the Strategy are ecotoxicology, landscape ecology, and population biology.

Dr. Gleason outlined the research themes covered under LTG 2 and gave a brief description of the posters affiliated with each. Two posters (LTG 2-1 and 2-13) addressed conceptual model research. Posters LTG 2-2 and 2-14 examined how baseline ecological risk assessments conducted in OPP can be improved through the use of new tools and methods. The theme of refining ecological risk assessment was covered by poster LTG 2-13, which looked at population/community impacts, areas of uncertainty, and mitigating measures that affect the probability and magnitude of effects. Exposure modeling (poster LTG 2-10) examines the key factors/uncertainties associated with probabilistic exposure assessments. Extrapolation research (posters LTG 2-3 through 2-6) addresses how to improve extrapolations across life stages/end points, species, and from the laboratory to the field for single chemicals and complex mixtures. Population ecology (posters LTG 2-7 through 2-9) studies the types of data and methods needed to incorporate population-level end points into the OPP risk assessment process. The final theme, landscape ecology, works to develop a methodology to predict wildlife population responses to multiple interacting stressors—both natural and anthropogenic—in real landscapes (poster LTG 2-11) and examines the effects of herbicides on regionally important native plants and plant communities (poster LTG 2-12).

In conclusion, use of the Wildlife Research Strategy as an organizing framework has permitted the development of an integrated research program involving modeling and extrapolation tools, population-level responses, and a spatial modeling platform. Partnerships across EPA and with OPPTS are central to the research under LTG 2.

Discussion

Dr. Best asked how the tools in development are applied to the risk assessment process. Dr. Gleason responded that regular meetings are held between ORD and OPPTS to determine the latter's needs. It has taken quite some time to develop an understanding of the two cultures of the organization, he explained, to be able to give OPPTS what it requires. ORD, based on its understanding of the needs, provides OPPTS with a tool; OPPTS then uses it and the two offices discuss the methodology. The process is integrative, and ORD still is working to improve the exchange, Dr. Gleason added.

Dr. Best commented that the population-level tools are difficult for the non-expert to use. Is ORD also developing simplifications of the tools to facilitate their use? Dr. Gleason responded that the tools in development are Excel-based so that they can be used easily.

Dr. Ault asked about the type of research that is being done to integrate the birth and death rates, taking into account the aspects of individual and population-level growth. In other words, are density-dependence and compensatory effects being accounted for? Dr. Gleason responded that compensatory effects are being captured.

In relation to the extent to which spatial and physical models are being coupled, Dr. Ault asked if that coupling is being integrated with population abundance to make the model more realistic. Dr. Gleason responded that a wildlife simulation model called PATCH (Program to Assist in Tracking Critical Habitat; poster LTG 2-11) has a population model built in to try to understand how species respond to the landscape. Dr. Ault asked: To the extent that results are being seen, as compared with the Fish and Wildlife Service, is there any active interaction between organizations that can be drawn into the models? Dr. Gleason responded that, to date, there is not enough integration across the organizations, but there is an attempt to involve the information that is available, such as through mining the literature. He added that there have not been enough partnerships with external organizations.

Dr. Ault asked how EPA is embracing the concept of focusing on community response and moving away from population modeling in support of a normalistic assessment of the species. Dr. Gleason responded that the response is varied. There still is much value in understanding how a single species responds; however, it also is important to develop a suite of models based on the understanding that communities involve interactions.

Dr. Ryan asked if there are strategies in place to disseminate the SP2 Program information within and outside EPA. Dr. Gleason replied that the Pesticide Program is somewhat different than EPA's other programs because decisions do not occur at the level of the regions but rather at headquarters in Washington, DC. As Mr. Jones explained, there are regular meetings and conference calls and interactions at the level of the program management office. Dr. Gleason added that publishing in the scientific literature and presenting research at local scientific meetings are other ways to disseminate information. There has not been concerted discussion, however, on distributing information to other agencies.

Dr. Di Giulio asked about Dr. Gleason's comfort level with the focus on population dynamics. He commented that there are situations of clearly highly integrated systems. For species that rapidly adapt, the population rate model would lead one to believe that those populations would not sustain an impact. Dr. Gleason indicated that he does not believe that considering a population-level model means that the other end points and data will not be considered. Instead, the model provides a broader concept to consider. Dr. Gleason added that in considering a response, it is important to understand that species are broadly distributed or contained. Dr. Di Giulio asked for clarification on how OPP takes that distribution factor into account when conducting risk assessments. Dr. Gleason responded that OPP is not yet using demographic models in its risk assessment process.

After confirming that there were no other questions, Dr. Harding invited the participants to attend the poster session at 9:30 a.m.

Following the poster session, Dr. Francis introduced Dr. Frederick to provide an overview of LTG 3. Dr. Frederick has a Bachelor's degree in Biology from Union College, a Master's degree in Bacteriology from the University of Rhode Island, and a doctorate in Molecular Biology from Michigan State University. At EPA for more than 22 years, Dr. Frederick first joined EPA as a Microbiologist and Section Chief in the Office of Toxic Substances. In 1988, Dr. Frederick joined ORD and held various positions. In 1993-96, he worked at the Stockholm Environmental Institute on biotechnology issues. Ten years ago, Dr. Frederick returned to EPA and since has been a Senior Scientist in NCEA.

LTG 3: Overview
Dr. Robert Frederick, Senior Scientist, NCEA, ORD, EPA

Dr. Frederick thanked Dr. Francis and the panel for the opportunity to discuss ORD's biotechnology research and then reviewed the main themes being addressed by the six posters in this section. Poster LTG 3-1 discusses the four key areas that ORD is addressing to assist OPP in its regulations of PIPs: (1) allergenicity of proteins; (2) adverse effects in non-target organisms; (3) gene movement to non-engineered plants; and (4) insect resistance management.

Beginning in the fall of 2002, a research agenda for biotechnology was developed in consultation with the program office and other federal agencies engaged in or using biotechnology research (e.g., USDA, the U.S. Food and Drug Administration [FDA], and the U.S. Agency for International Development [USAID]). The planning included a review of in-house capabilities and expertise. The plan for the Biotechnology Research Program was published and can be found online at http://www.epa.gov/nheerl/publications/. Dr. Frederick explained that the research would complement work done outside the Agency over the past 15 years on the potential for environmental impacts from biotechnology products.

Dr. Frederick mentioned that the first APG under LTG 3 is to provide increased capability to assess the risks of allergenicity from genetically modified (GM) food. Poster LTG 3-2 related to the topic of allergenicity of PIPs, examining the potential allergenicity of proteins introduced into the food supply by gene transfer and addressing whether animal models, *in vitro* assays, and structure-activity databases can be developed to assess potential allergenicity. The Biotechnology Research Program has leveraged in-house efforts, Dr. Frederick explained, through an extramural effort. In that regard, NCER awarded four extramural grants through the STAR Program last year.

A second LTG 3 APG is to provide science-based risk assessment tools and data to evaluate ecological risks and long-term safety of use of GM crops with PIPs. Dr. Frederick mentioned that more than 90 percent of cotton crops in the United States are genetically modified, with multiple traits being introduced. It is important, he stated, to develop improved methods to understand and monitor agroecosystem effects from the large scale adoption of PIP crops. Poster LTG 3-5 focused on non-target agroecosystem impacts using insect and molecular assays. The future impacts of this work include improved quantization of ecological exposures and science-based evaluation of potential effects on non-target species and the development of new insights on the influence of spatial and temporal scales on the detection of impacts.

A third APG involves the development of guidelines and tools to mitigate gene-transfer and non-target effects and help in the management of environmental risks associated with PIP crops.

Working with experimental plots of GM bentgrass, the research for poster LTG 3-3 addressed the topic of gene flow in GM crops, how the flow can be measured, and ecological consequences. Poster LTG 3-4 covered the topic of resistance management and included a stochastic simulation for Bt resistance development and the use of remote sensing technology to detect crop damage. Among the future impacts of this research are understanding the molecular and population genetic basis of resistance management and developing new tools for monitoring compliance with resistance management requirements in the production landscape.

Poster LTG 3-6 addressed the theme of monitoring risk and benefits. In the early planning stages, this presentation explained the development of a collaboration across laboratories and centers to develop an agroecosystem monitoring program designed to assess changes in pesticide exposure and effects accompanying transgenic crop adoptions.

Dr. Frederick concluded by mentioning that ORD cooperates with program offices at many levels, including via intra-Agency workgroups for rules development; organization of researcher-regulator science meetings; and review and evaluation of extramural agreements. The Biotechnology Research Program also has had many interactions extramurally, involving other federal agencies (e.g., USDA, FDA, USAID, and the Department of Energy) and several universities.

Discussion

Dr. Coats commented that the term "monitoring" was mentioned several times in relation to resistance and spatial and ecosystems effects. He asked whether the gene products (i.e., proteins) themselves are being monitored in the environment and whether analytical methodologies are being developed or improved. Dr. Frederick replied that industry has dealt with the development of methodologies and that the Agency has encouraged their development. Dr. Coats then commented that, in relation to ecological risk assessments, he is not sure how accurate ELISAs are for use in environmental matrices. Dr. Frederick responded that companies have developed the methodologies for environmental monitoring of GM products as they exist in seeds and fields when plants are growing. He added that the Agency has some restrictions on its ability to conduct research activities that involve proprietary products. For example, certain collaborative agreements are necessary with firms before being able to use their products in Agency research.

Dr. Graham commented about the risks of creating GM pesticidal proteins. Dr. Frederick stated that he would like to see more work done in relation to changes in pesticide use patterns as a result of the adoption of transgenic plants. He noted that the Pesticide Program work falls under the Federal Insecticide, Fungicide, and Rodenticide Act—a risk-benefit statute—so it is important to understand the potential benefits. Dr. Frederick added that it is critical to understand the potential impact of GM materials on ecosystems, as well as their impact on agrochemical practice, for meaningful cost-benefit analyses of pesticide use reduction and the ecological consequences of reducing those pesticides.

Dr. Blanco noted that the Biotechnology Research Program has accomplished much work since its inception 3.5 years ago. What will happen in the future, however, with the rapid evolution of the GM crops, when there are more proteins and more registrations necessary? Dr. Frederick responded that the single trait product probably is a thing of the past and that future product

submissions to EPA will involve multiple traits. He added that it is hoped that the program will include methodology to assess plants with multiple traits.

Dr. Coats asked whether there is any policy or recommendation on how the refugia are treated or untreated by the growers and how that might affect their effort to minimize or eliminate any resistance. Dr. Frederick responded that much research is ongoing to understand the spatial relationship between refugia and GM crops and the movement of insects between refugia areas and GM crops. He mentioned a publication that reported a surprising finding that since the 10 years of introduction of GM crops in the field, resistance has not developed; this was not the outcome that was first predicted. Dr. Frederick added that researchers are involved in screening programs to track resistance alleles and have better criteria for determining appropriate refugia design.

Dr. Harding thanked Dr. Frederick and invited the participants to attend the LTG 3 poster session.

Poster Session Discussion: LTGs 2 & 3

Dr. Harding asked Drs. Ault and Blanco to lead this poster session discussion on LTGs 2 and 3, respectively.

Dr. Ault commented that he was impressed with the range of sophisticated approaches that went beyond the bounds of standard methods. He added that it is a challenge to link the various levels—physiological, molecular, and so on—when addressing a problem. Dr. Ault stated that he noticed some strong work in some fine journals and that there was a high degree of integration and collaboration in a systems approach on the analytical side. Although there were some very impressive presentations on existing model processes, Dr. Ault stated that it seemed that some of the model processes had asymptoted and he wondered whether it would be possible to anticipate the leading edge. He added that it was not clear whether those processes could be adapted or adopted in a modeling group. Dr. Ault explained that risk assessments are only as good as the types of basic data and the precision and quality of the data and models that they represent. He stated that he did not necessarily see a centroid that would represent a range of risk assessment processes. He suggested that the program needs to be built and allowed to mature while seeking out and working out the linkage between EPA and other agencies. In relation to emerging ideas, Dr. Ault added that working more with industry is key, rather than being in a firefighting mode.

Dr. Ault gave the analogy of the inverted pyramid. He explained that an idea in biology is that the answer lies in the data; in reality, however, this is not how the system works. He stated that there is at least a 50:50 proposition between data analysis and modeling. The importance, he explained, is to find the strategic balance. He suggested having internal symposia among the investigators. The work displayed a sound academic connection and a wealth of knowledge outside EPA that would foster a strong synergistic effect for creating a consortium. Dr. Ault concluded by stating that he saw some solid empirical work that was state-of-the-art (e.g., modeling metabolism).

Dr. Graham commented that the last two posters for LTG 2 were presented by OPP investigators and that she was impressed that they were just as enthusiastic, if not more so, than some of the

other investigators. To her, this was a demonstration of the value of ORD's research under LTG 2. Dr. Graham agreed with Dr. Ault regarding the models. Although there are models in various stages of development, the question will be whether they will have the necessary resources to achieve what needs to be done. In some cases, she added, feedback occurred such that the standardized method that was created could be used by others to populate the model with data. Dr. Graham noted that she was pleased to see the investigators reaching out to other disciplines and not being insular in their work.

Dr. Blanco commented that promising methodology developed for the scientific community should be made available broadly and as quickly as possible. He applauded the work in the posters for LTG 2 and added that he derived many good ideas from the research that he could apply to his own work. Dr. Best agreed with Dr. Blanco that once the research was available, it would have valuable applicability to other systems.

Dr. Adams also echoed Dr. Blanco's statement that the faster the tools can be distributed to the public as they are developed, the better. He added that EPA and ORD are in a unique situation to be a "clearinghouse" for collecting information—from the registrants' information, from the work the Agency funds, and so on.

Dr. Harding asked Dr. Blanco to begin the discussion on the poster session for LTG 3.

Dr. Blanco began by stating that he was very pleased with the work presented both yesterday and in today's session. He recalled a comment made by a member of the Subcommittee that EPA knows how to do great work even when faced with tight budgets, something that not all organizations can do. He mentioned, as Dr. Frederick had stated, that the traits of the crop varieties are evolving so fast that long-term work is a challenge. Also, a challenge is the short-term crop turnover of about 6 months in the field, either because of crop rotation duration or the economics for that year.

Dr. Blanco commended the level of collaboration and the quality of work in the presentations. He stated that for the past 5 years at professional meetings that he has attended, EPA has produced top-quality research in biotechnology. Moreover, the four main goals that have been established (allergenicity, adverse effects, gene movement, insect resistance management) have all been met. Dr. Blanco praised the publication record, notably the paper on gene flow that has been highly cited and has had a major impact. He added that the other papers also have been instrumental in other fields.

Dr. Best commented that she was glad to learn about a plan to develop a monitoring program to assess environmental effects and transgenic crops. She cautioned that it also is important to weigh the benefits along with the risks when examining the risk assessment approach, particularly when dealing with GM crops. She commended the work for its integrated nature and cooperation between agencies.

Dr. Harding pointed out that Drs. Coats and Di Giulio addressed poster LTG 3-5. She asked if the database being developed in that project is publicly accessible and, if so, who would be interested in using the data that will be available. Dr. Di Giulio responded that he did not learn this from the presentation. Dr. Coats replied that the scientific literature is one means by which to make the database accessible.

Dr. Frederick explained that the database was developed at Santa Clara University and that the investigators have an agreement with the National Center for Ecological Analysis and Synthesis (NCEAS), which has extensive experience in database establishment and maintenance. NCEAS has agreed to maintain the database when it goes public, and its general access will be made available via the Internet. A concern, however, is the maintenance of the database over time, for which there do not seem to be resources in place. Dr. Frederick commented that most likely the users of the database would be the individual scientists in the risk management process. Industry also would patronize the database to assess new products, examine information already available to improve on their own efficiency, and to design new items for the future. The general public and groups interested in learning more about transgenic crops also will benefit from the database because it provides a central bank of resources through which to find information and ask questions.

Dr. Best recalled Dr. Frederick's comment about the Biotechnology Research Program working with the federal agencies for biotechnology research, including USAID. Does this mean that the program also makes USAID aware of the latest results of their gene flow work? Dr. Frederick confirmed this statement, mentioning that there is a continuing dialogue with USAID and that the biotechnology program investigators are asked as a group to comment on proposals USAID receives for funding. He added that USAID is expanding on work that has been done in the United States and in Europe. Dr. Frederick gave the example of a U.S.-trained scientist who took his research back to India to examine resistance monitoring of insects in eggplant fields. This work showed tremendous variation, he added, with results comparable to those that have been found in the United States with corn and cotton.

Dr. Ryan commented that LTG 3 should stand as a model because it involves extensive communication between different agencies and many levels of cooperation of ORD with program offices. He stated that this is a very positive direction and that he would like to see more of these types of interactions.

Dr. Adams commended EPA for taking the right tactic on the four approaches mentioned earlier (i.e., allergenicity, adverse effects, gene movement, and insect resistance management). The world is looking to EPA for guidance in these areas, Dr. Adams added, and the European Union (EU) also is taking a leadership role. With millions of acres of GM crops in the United States, EPA has to be a responsible gatekeeper of the information and to be cognizant of unintended consequences.

Dr. Harding commented that a table in the MYP indicates that more resources would be allocated to LTG 3 work as more is accomplished under LTG 2. Likewise, resources would be moved from LTG 2 to LTG 1 as more happens with the modeling efforts. Dr. Ault responded that this shifting of resources is beneficial, but noted that there should be more emphasis on the connection between empirical modeling and risk assessment. He explained that the models are very good at face value, but capturing interaction effects will require an entirely new schema. As more data become available, more opportunities for synthesis are becoming critical. Dr. Ault emphasized that the models should be sophisticated enough to handle the complexity of the computational problems at hand.

Dr. Graham mentioned that the budgetary pie charts for LTG 3 in Dr. Francis' presentation allocated $6.1 million from the FY2007 President's Budget, whereas for FY 2008, the allocation

is $4.1 million. Dr. Harding pointed out that information on the future of the funding also was provided in the Subcommittee members' binders.

Dr. Coats commented that there are concrete needs for more resources in the area of research under LTG 3. He added that although the four objectives that have been identified are salient concerns to address, much more work is needed beyond those areas. He mentioned the development of analytical techniques as one additional area of focus.

Dr. Francis introduced Mr. Willis to discuss how ORD's research is helping OPPT meet its regulatory needs. Currently, the Director of EPA's Chemical Control Division in OPPT, Mr. Willis has been with the Agency for more than 20 years in various senior management positions. He also worked with the United Nations for a number of years before returning to EPA.

OPPT Perspective of ORD's SP2 Research

Mr. Jim Willis, Director, Chemical Control Division, OPPT, OPPTS

Mr. Willis expressed his gratitude for the opportunity to participate in the meeting. He prefaced his presentation by mentioning that upon returning to EPA after 9 years, he was impressed by the positive changes in the relationship between ORD and OPPT. For example, he recognized ORD's support and leadership in issues pertaining to PFOA and nanotechnology.

Working under the statutory authorities of the Toxic Substances Control Act and the Pollution Prevention Act, OPPT has developed two roles: (1) as gatekeeper/guardian of potentially risky new chemicals and manager of existing chemicals; and (2) as a promoter of environmental stewardship and sustainability. Central to OPPT are the New Chemicals Program, the High Production Volume Chemicals Program, the Existing Chemicals Program, nanotechnology, pollution prevention, and national priority chemicals (e.g., mercury). Mr. Willis explained that research under LTG 1 will prove valuable for addressing uncertainties to improve risk assessments and helping to identify risk management options. The work also will support OPPT partnerships internationally.

ORD projects that are contributing to OPPT's risk assessment process include the OPPT Draft Risk Assessment on PFOA; ORD's research on various issues regarding the toxicology of PFOA (e.g., hazard/dose-response); and ORD work regarding the sources and pathways of human exposure to PFOA. Mr. Willis mentioned that PFOA research already has had several impacts on OPPT's hazard, exposure, and risk assessment activities for PFOS and PFOA, as well as international assessments. For example, developmental toxicity studies have been incorporated into the draft 2006 Organisation for Economic Co-operation and Development (OECD) assessment of PFOA.

Mr. Willis explained that ORD also is contributing to OPPT's international partnerships. For example, ORD and OPPT have contributed to OECD's Quantitative Structure-Activity Relationships (QSAR) Application Toolbox. In addition, ORD and OPP jointly are hosting a related OECD Workshop slated for fall 2007 in Washington, DC. Mr. Willis added that ORD research on predictive tools and information management will impact OPPT and its international partners' ability to assess the hazards of large numbers of chemicals more efficiently.

Much activity also is underway in the nanotechnology realm. Mr. Willis mentioned that the Science Policy Council White Paper on science and research needs involved nanotechnology case studies co-led by ORD and OPPT; this paper includes the ORD research framework on nanomaterials. Internationally, work is occurring through the OECD Working Party on Manufactured Nanomaterials, whose tasks include testing representative nanomaterials. Nanomaterials also are being addressed through OPPT programmatic work, including a P2 benefits conference that ORD and OPPT are sponsoring jointly to cover research into developing nanomaterials that have distinctive pollution prevention benefits.

Discussion

Dr. Graham praised Mr. Willis' presentation and stated that she could not agree more with the points made. She asked whether ORD research in nanotechnology will be aligned closely with OPPTS work. Mr. Willis responded that ORD was the first part of EPA to engage in nanotechnology via the STAR grant program. This year, the grant program's budget has increased from approximately $4.5 million to $8.6 million, some of which will be allocated to the laboratories for nanomaterials work. Mr. Willis added that no single organization will be able to conduct all of the research on nanomaterials. The key will be for organizations to work together. He commented that the research framework, current year funding, and future year plans all move ORD in the right direction with regard to nanotechnology. Research in other countries also will be instrumental in the testing, including a program in Japan to test and characterize nickel oxide nanoparticles, C_{60} fullerenes, and multiwalled carbon nanotubes.

Dr. Graham asked for a general comment on the draft charge question that relates to providing data in a timely manner. Mr. Willis responded that the question is difficult to answer beyond simply stating that the timeliness has been great. He explained that EPA can generate data on chemicals by its own work or through interaction with companies. In Mr. Willis' view, working with ORD is the best way to achieve rapid response innovation because it affords flexibility and avoids the protracted negotiations that can occur with companies.

Dr. Graham asked for Dr. Willis' view of how ORD can serve a greater leadership role in OECD. Mr. Willis responded that there are a number of areas, such as nanotechnology and methods development, in which ORD's participation in international work is critical.

Dr. Coats noted that a topic of increasing concern that the Subcommittee has not yet addressed is pharmaceuticals in the environment. He asked if there is any formal or informal approach in place to deal with this issue. Mr. Willis replied that the pharmaceutical industry is a challenge for EPA because there are a number of legal issues associated with EPA regulatory authorities; FDA has authority over this realm. Dr. Coats asked if this also is the case if pharmaceuticals are involved in an environmental issue. Mr. Willis responded that the challenge is addressing a pharmaceutical issue that is associated with the environment without addressing the drugs themselves.

Dr. Francis explained that under the Office of Science and Technology Policy (OSTP) there is an interagency working group on pharmaceuticals in the environment, co-chaired by EPA and FDA, with one of the co-chairs being Dr. Zenick. Dr. Francis stated that EPA has been working across federal agencies on how to develop and collaborate on a research program in this area. The challenge is that the area does not fall solely into any one regulatory arena. EPA is looking into

various stewardship programs that could be used to reduce exposures to pharmaceuticals and personal care products in the environment. Other efforts include research in the Endocrine Disruptors Research Program, which issued an RFA related to the impact of hormones that are associated with concentrated animal feeding operations on the environment. Dr. Francis added that EPA hopes to award seven grants in this area through an intramural program that issued an RFA last year. Areas of focus include pharmaceuticals administered to animals and work related to the natural excretion of hormones. The hope is that some of the grants will become cooperative agreements.

Dr. Graham asked about the involvement of the regions in this work. Dr. Francis responded that regional teams have been invited to participate in the SP2 planning teams, but most of the regions have not raised specific needs for the program. Other research programs, including those for air and human health, are addressing the regional needs. Dr. Francis added that she sits on a cross-regional working group and the pharma issue is one area in which the regions would like EPA to conduct more research. The concern, however, is that there is no budget in place for this work. Also, it is difficult to shift funds from an area that has immediate needs and regulatory authority in place to an area for which no specific regulatory authority exists. Dr. Francis added that the regions are looking for safer alternatives to classes of chemicals and are working with pollution prevention staff to design safer chemicals.

Mr. Willis commented that OPPT has a number of relationships with the regions. For example, all of the regions have had asbestos, polychlorinated biphenyls, and lead activities. He added that pollution prevention and enforcement is exercised at the regional level.

Dr. Coats asked if there is any formal relationship between ORD and the Green Chemistry Initiative. Dr. Francis responded that the STAR Program had a robust green chemistry research program for a number of years and worked very closely with the National Science Foundation on issuing a joint program on technology for sustainability. That program was eliminated, she stated, because of budget cuts. Another program, which was called Pollution Prevention and New Technologies Research until a few years ago, also experienced budget cuts. EPA has been trying to refocus the program, Dr. Francis added, and it has acquired more of a sustainability slant. She added that this program will be undergoing a BOSC review next month.
Ms. Alva Daniels, Assistant Laboratory Director–Multimedia, NRMRL, ORD, confirmed for Dr. Francis that green chemistry is part of one LTG of this program on sustainable development.

Preliminary Subcommittee Discussion of Charge Questions/Rating of LTG 1

Dr. Harding asked the Subcommittee members to take a few minutes to review the four rating categories on page 7 of the draft charge. The Subcommittee used the criteria to prepare a summary assessment for LTG 1. She then asked each of the workgroup leaders for LTG 1 Subparts A, B, and C to begin the discussion.

The three questions under Summary Assessment, page 6, of the draft charge were as follows:

1. How appropriate is the science used to achieve each LTG (i.e., is the program asking the right questions, or has it been eclipsed by advancements in the field)?

2. How good is the scientific quality of the program's research products?

3. How much are the program results being used by environmental decision makers to inform decisions and achieve results?

Dr. Graham stated that she would address Subparts A and B and that Dr. Coats would speak to Subpart C.

Subparts A and B

In relation to question 1, Dr. Graham explained that she would change the precision of the language used. She mentioned that one of the APGs asks for the development and validation of methods, but that validation likely will not occur because the millions of dollars in needed funding are not available. Dr. Graham stated that Subparts A and B are asking the right types of questions and are conducting futuristic, long-term types of research and involving high-throughput methods. She commented that the approach of the research detailed in poster LTG 1-9 is intelligent; this work is developing a rapid means of evaluating potential reproductive toxicity using immortalized murine Sertoli cell cultures. In terms of asking the right types of questions, Dr. Graham noted that LTG 1 does not ask anything about exposure and is not addressing nanotechnology. The workgroup is recommending that the program have better balance in its research coverage.

Regarding the second question, Dr. Graham stated that publications in the literature attest to the scientific quality of the program's research products. The articles received higher than average ratings through the bibliometric analysis, were published in high-impact journals, and did not have a high self-citation rate. The workgroup would like to have more publications per project per poster. Overall, however, the science quality as judged by peers is good. Dr. Graham noted that another means of judging scientific quality is via the standing of the researchers in the field. She gave the example of scientists being invited to give presentations on their work. She added that top-quality research requires top-quality scientists and that many of the LTG 1 scientists are highly regarded.

Addressing question 3, Dr. Graham commented that the main environmental decision-maker in the SP2 Research Program is OPPTS, but there are others as well. She explained that her workgroup raised the issue relating to the regions. Although regions are connected with ORD, the link is indirect. For instance, when regions address questions to the policy office of OPPTS and the office lacks the answers, it can provide the contact information to the relevant ORD investigators. Dr. Graham commented that it must be considered that scientists need to devote their time to research rather than to making telephone calls or even participating in peer reviews. She added that some of the OPPTS investigators are involved with long-term research and this is beneficial, as it will enable the research to be more relevant in the future.

Dr. Graham stated that one of her workgroup's concerns related to the issue of validation and evaluation. She explained that when an OECD/OPPTS test guideline is released, the research has to be evaluated/validated fully. Although the investigators are aware that their research must pass this stage to be usable in a laboratory, they did not appear to factor it into their plans. The workgroup recommends, therefore, that research plans include details on having the work tested.

Dr. Graham welcomed comments from the Subcommittee members. Dr. Best stated that she thought that Dr. Graham summarized the points well.

Subpart C

Dr. Coats began the discussion on Subpart C and welcomed Drs. Adams and Ault to share their input as well. Dr. Coats commented that the projects that were reviewed all seemed to focus on urgent, short-term needs. All of the projects were relevant, he added, and the overall quality of the work was excellent. They also did an outstanding job responding to constraints on quickly deciding what the most urgent questions were to address. The projects involved excellent collaborations and also were very well coordinated. Where the projects differed, however, was in terms of their publications; some published more than others, and in certain cases, the higher priority seemed to be addressing questions posed by the client rather than publishing in the literature. Dr. Coats added that the clients appear to be using some of the results, but other projects are not as far along yet to have produced usable findings.

Dr. Ault commented that it was difficult to note the difference between responsiveness of Subparts A and B. He added that it was hard to separate the three subparts from one another because, technically, they are in the same grouping. This raises the question, Dr. Ault stated, of whether there are adequate models to anticipate conditions.

Dr. Graham commented that she is less concerned about anticipating outcomes at this point. She explained that Subpart A deals with screening and Subpart B relates to the test methodology. When the program office has a serious problem, such as PFOA, then the focus will be on screening. Dr. Graham added that the screening must be in place to be able to interpret the test methods. She mentioned Mr. Willis' comment that nanotechnology work currently is anticipated. Because of this anticipation, OPP is taking appropriate steps in that direction but has not mounted a full-scale research program, she explained. Dr. Coats added that this point underscores the importance of screening to predict toxicology, modes of action, and so on.

Dr. Graham suggested that Dr. Francis could help to address the differences between the shorter and longer term needs. Dr. Coats pointed out that perhaps some needs are short term but are not urgent. Dr. Ault proposed that it also would be good to have more information about the distribution of the funds. Dr. Harding noted that when resources are shifted within an LTG, it is most often to address short-term needs that require immediate work.

Dr. Francis responded that there is no simple answer regarding the distribution of resources among the LTG Subparts. She explained that the previous MYP had four LTGs, with the fourth LTG focusing on novel classes of compounds (i.e., newly emerging hazards of concern), including work on PFCs and non-target plant work. The program was very small, she explained, with eight FTEs, less than $200,000 in funds, and was restructured to make biotechnology into its own LTG; the remaining focal areas were moved under Subparts A and B. Dr. Francis stated that the shorter term goals were acknowledged as important but were difficult to balance with other parts of the research program. To accommodate immediate needs, resources are shifted within the program, and when necessary, certain projects might have to be delayed. Dr. Francis added that there always is the effort to leverage resources as best as possible.

Dr. Ault commented that the budget would require that monies are listed as required. If additional funds are required, how does that affect the APMs? Dr. Francis responded that if funds are shifted between areas, then OPPTS will help ORD decide which research areas will be delayed. She added that APMs might be impacted by such changes, but in a timely manner.

Dr. Harding then turned the meeting to a discussion of the rating for LTG 1. She listed the four rating criteria—"exceptional," "exceeds expectations," "satisfactory," and "non-satisfactory"—and mentioned that she has not heard any comments to suggest that the work under LTG 1 is not "satisfactory." She reminded the group that the original rating of "better than satisfactory" was changed to "exceeds expectations" at the last BOSC meeting.

Dr. Harding read the definition of the "satisfactory" rating and asked the Subcommittee members for their input. The Subcommittee members agreed that the program performance lies between "satisfactory" and "exceeds expectations." Dr. Harding asked whether the Subcommittee was open to considering the rating as "exceptional."

Dr. Di Giulio asked what the consequences are of the program meeting a rating. Dr. Harding asked how the results of the ratings will be used.

Ms. Lori Kowalski, DFO, BOSC Executive Committee, responded that the current review involves an independent committee that must come to a consensus at the meeting. She added that the BOSC Executive Committee is not present to provide feedback.

The Subcommittee agreed on the following four posters as representing examples of "exceptional" work under LTG 1:

- LTG 1-12—Dr. Blanco stated that this work involves a very reliable method that cuts the costs of screening.

- LTG 1-15—Dr. Ault stated that the merits of this project include that it is very well organized and has an exceptional number of publications produced.

- LTG 1-16—Dr. Adams stated that turning a screening tool into a sensor is an outcome that exceeds the expectations of the project's original goals.

- LTG 1-19—Dr. Best stated that the approach taken by the work on QSAR was well done and in a very useful area.

Dr. Graham asked that the individuals who nominated the examples of "exceptional" work provide a couple of sentences as rationale for their nomination. She stated that she would provide a summary paragraph that captures the three questions on page 6 of the draft charge to indicate a baseline rating, followed by the above examples that exceed that baseline.

Dr. Harding summarized by stating that the Subcommittee has agreed to rate the work of LTG 1 as "exceptional" and that the same rating system will be applied to LTGs 2 and 3 on Day 3 of the review. She asked that each of the workgroups provide her with a brief summary that she could read tomorrow during the general report out session.

Closing Remarks

Dr. Francis reviewed the next steps to be taken following the SP2 Research Program evaluation. Upcoming plans include: working with OMB on a Program Assessment Rating Tool submission due March 2007; developing a Web site to communicate results; and identifying synthesis documents. Dr. Francis noted that she plans to make an improved effort to visit the laboratories and regional offices to meet with PIs and make better connections. Continued work for the program includes improving coordination/leveraging with other research programs; improving on the integration of regional input; improving engagement with OPPTS and OW senior management; developing cross-laboratory/center opportunities for integrated research; and holding targeted scientist-to-scientist workshops.

Various issues that still require work include developing predictive tools for prioritizing chemicals for screening and/or testing and communicating results of SP2 research to other federal agencies. Dr. Francis mentioned that this communication can involve participating on interagency working groups. She gave the example of a biotechnology research working group under the Committee on Science of the National Science and Technology Council. Engaging each other on developing research (e.g., pharmaceutical topics) also is a means of relaying results in addition to presenting research at professional society meetings and workshops.

Dr. Francis concluded by thanking the various organizers and planners involved with the SP2 program review, the SP2 Multi-Year Planning Team, and all of the speakers and poster presenters.

Ms. Drumm reminded the Subcommittee members to meet in the hotel lobby at 7:30 a.m. on Day 3.

Public Comment

At 4:01 p.m., in accordance with FACA requirements, Dr. Harding called for public comment. No members of the public had indicated that they wished to offer any comments.

Adjournment

The meeting adjourned at 4:42 p.m.

Friday, February 9, 2007

Preliminary Subcommittee Discussion of Charge Questions/Rating of LTG 2 & 3

This final day of the program evaluation began with a review of the agenda by Dr. Harding. The agenda included a preliminary discussion of the charge questions and rating of LTGs 2 and 3. Each workgroup had prepared summaries for Dr. Harding to read at the general report out at 11:00 a.m.

Dr. Harding asked whether all of the Subcommittee members were satisfied with what had been discussed for LTG 1 on Day 2. Dr. Adams responded that he was satisfied but still is working on his report. Dr. Graham asked that more information be provided on the Carolina Environmental

Bioinformatics Research Center (poster LTG 1-15) for the summary statement for LTG 1. No other comments were offered in relation to LTG 1.

Dr. Harding asked Dr. Ault to begin the discussion on LTG 2.

LTG 2

Dr. Ault began by stating that his workgroup looked for "stellar" examples of linking empirical and analytical work with probabilistic risk assessment. The work of Nichols, et al. (poster LTG 2-3) was deemed impressive and observed to have a strong publication record and broad range of collaboration. The work by Ankley, et al. (poster LTG 2-5) also was noted as outstanding and assessed as having a remarkable integration of external partners. On the modeling side, Dr. Ault stated that there were several very good papers, including the research by Grear, et al. (poster LTG 2-7), which was identified as doing a very good job of connecting structure/population models, age, and size/structure models with physiological measurements. The work of Schumaker (poster LTG 2-11) took the work a step further, Dr. Ault explained, by examining habitat along with stressors and effects.

Dr. Ault suggested that the research should put more thought into how the models ought to look. Although examining the population level is fine, at some point it will be necessary to link populations and community effects. Dr. Ault cautioned that the modeling work requires a higher level of thinking and the projects that were discussed did not indicate that the modeling is moving toward the leading edge. There was no prospective thought given, he continued, to the nature of the work as it ties to the statistical modeling. Dr. Ault explained that he sees the work as a timeline, with some very good examples that are consistent with the LTG 2 goals. At the same time, it is important to have a longer term view to know where the program will be in 5 or 10 years. Overall, Dr. Ault summarized, there were some very good examples, with great examples of partnerships between external groups, particularly with some state-of-the-art groups.

Dr. Harding commented that this feedback will prove valuable in providing recommendations for the program.

Dr. Di Giulio commented that he was very impressed with the science of the LTG 2 group, especially with some of the basic science research. The mechanisms also were impressive, such as the approaches taken for the population models. Dr. Di Giulio also appreciated how the work was integrated across several laboratories. He noted that having a heavy focus on population-level effects largely is appropriate, but he has observed through his own work that those effects cannot necessarily be measured in highly integrated systems. The work by Ankley, et al. (poster LTG 2-5) was especially effective, Dr. Di Giulio stated, with its large group of interdisciplinary researchers. In agreement with Dr. Ault, Dr. Di Giulio stated that the modeling efforts had benefited from state-of-the-art academic groups. He recommended that the groups look more beyond academia in their endeavors.

Dr. Blanco stated that he was satisfied with the responses given by Drs. Ault and Di Giulio. He added that one concern he has is that the important work underway will be phased out in a number of years. Dr. Di Giulio agreed with this, adding that one table in the SP2 MYP (page 17) indicates that the level of funding for LTG 2 will remain steady from 2007 through 2015, but

will decrease once probabilistic tools are developed and implemented. Dr. Harding asked that the Subcommittee be given clarification on this point.

Dr. Francis explained that there is an understanding regarding the SP2 Research Program that by the time models are implemented, certain projects will no longer require the same level of resources. The hope is that the science will continue to evolve and that research time will not be spent constantly on the same types of efforts. Once a product is produced and it is being used, new research takes over. Dr. Francis added that all of the MYPs have been asked to account for possible long-term adjustments in resource allocation.

Dr. Ault commented that it still is important that the modeling activity, the empirical work, and so on, be put into a frame of reference. His impression from the presentations was that there are some insular groups that did not interact much with investigators outside their immediate spheres. He explained that improved communication is needed at the level of modelers and assessors to have stronger and clearer linkages and improved experimental design. Dr. Ault added that workshops are opportunities for discussion of opportunities and limitations.

Dr. Harding asked whether Dr. Ryan had any comments on LTG 2. Dr. Ryan responded that both the database development and modeling work he saw are very good.

Dr. Coats stated that the work by Nichols, et al. (poster LTG 2-3) was excellent and that he was in agreement overall with the viewpoints of the other Subcommittee members. Dr. Best also agreed with the points made. She noted that spatial and behavioral aspects of community-level research are important directions to pursue.

Dr. Harding asked the Subcommittee members if they have any concerns regarding the rating scale and how each term is described.

Dr. Graham stated that she has a problem with the term "all" and that she is unsure whether "goals" are referring to APGs. Also, regarding the phrasing under the definition for "exceptional," "the speed at which research result tools and methods are being produced," Dr. Graham asked what speed means in relation to research. She stated that 10 postdoctoral researchers will generate more work than just 1 postdoctoral researcher. Dr. Graham added that some of the language of the rating tool is not integrated with how research works.

Dr. Harding responded that "goals" refers to the APGs. In this light, the Subcommittee must consider whether APGs are being met to achieve the overall goal. She explained that the first tool was discontinued because it was inadequate, involving check boxes. The qualitative tool was perceived as one that would work better.

Dr. Graham asked how it is possible to meet or exceed a goal that is all-encompassing. Thus, how can the development of methods be exceeded? Mr. Phillip Juengst, Accountability Team Leader, ORD, explained that the purpose of the development of the rating tool through the BOSC Executive Committee with OMB was to add to the existing BOSC review a set of evaluative feedback for ORD to use to manage and improve its programs. Mr. Juengst explained that the tool was made to focus on relevance, quality, and performance of the program as it relates to serving the clients and achieving outcomes, and this is captured by the summary narrative and assessment for each LTG. Mr. Juengst stated that the Subcommittee needs to

decide what achieving the goals within each LTG means. He added that the group should be assessing the APGs and APMs for each LTG.

Dr. Harding responded that if the Subcommittee members are working from the APMs, which have timelines, then it is important to note whether or not the program adheres to its designated dates. She reminded the Subcommittee members that they will have the chance to make suggestions to the BOSC Executive Committee on how the rating tool works.

Dr. Best stated that her workgroup was concerned that although most of the APMs were met for LTG 3, some might have been missed. She suggested that perhaps some of APMs were not described.

Dr. Ryan asked whether the rating tool should be applied to a more micro level, to consider all of the posters, projects, subprojects, and so on, for each LTG. Dr. Graham responded that even if one considers the goals for each poster for a given program review, it is possible to observe poor posters. As it turned out for LTG 1, she added, excellence was the prevalent quality.

Dr. Coats shared his view that the purpose of the rating is to assess the overall quality of the work and not to "bean count." Dr. Di Giulio agreed, adding that the criteria are written in a way that they are more likely to apply to the aspects of research that are not quantified easily.

Dr. Harding asked the Subcommittee members whether all of the APGs are being met for LTG 2. Dr. Ault responded that the APGs are being met, and the Subcommittee members will provide additional input where appropriate. Dr. Di Giulio added that even if something is rated as "exceptional," there are exceptions.

The Subcommittee members agreed to assign an "exceptional" rating to the LTG 2 program.

Dr. Harding asked if the BOSC Executive Committee will read the report produced by the Subcommittee and provide any different ratings. Ms. Kowalski explained that the purview of the BOSC Executive Committee is to make any changes. She mentioned that in the past the Executive Committee made changes to the report; in several cases, the Chair was asked to return the report to the Subcommittee to review items and then make changes.

Dr. Harding asked Dr. Blanco to lead the discussion on LTG 3.

LTG 3

Dr. Blanco stated that his workgroup decided that the LTG 3 research program is meeting all of its goals and that all of its benchmarks have been completed. The members were satisfied with the results of the work, which involved high-quality, leading-edge collaborations. The workgroup noted that because the program is so new, it is uncertain how the program will perform in the near future (e.g., meeting the APMs for 2010). They acknowledge that there are legal restrictions, as Dr. Frederick mentioned on Day 2, that might prevent EPA from accessing resources to which a company holds the proprietary rights. Dr. Blanco added that these restrictions complicate the judgment of the program's ability to meet certain year targets for accomplishments.

Dr. Best agreed with Dr. Blanco's points, adding that the workgroup was enthusiastic about the scientific quality of the products. The program is producing several journal articles, with at least one (i.e., on gene flow) published in a highly visible journal. Moreover, the program has a patent pending for its work on an optical system for plant characterization through remote sensing technologies (poster LTG 3-4). Dr. Best explained that it is important to discuss the clarity of the public benefits in relation to this program. Currently, the main environmental effects being discussed are the potential effects of GM crops and the impact on non-target organisms; however, there might be other effects that are not yet evident. She stated that the combination of risk analysis and environmental-benefit analysis enables the comparison between beneficial and adverse effects of PIP crops. These analyses will be particularly critical in the near future, she added, when there will be less food for more people.

Dr. Best explained that the program is unique but also is very narrow because there is uncertainty about how it will perform in just a few years' time. She listed some recommendations that the workgroup formulated for broadening the program. For example, the research could include PIP crops with multiple engineered traits. Also, the study should not be limited to agricultural systems. Because this type of research is novel, it will serve as a template for research elsewhere in the world. The workgroup also recommended monitoring proteins in the environment, developing improved analytical methods for environmental matrices, and anticipating work on biopharming.

Dr. Coats commented that the workgroup agreed that the four critical issues being addressed by LTG 3 are very urgent needs and the program has addressed them very well. He added that the work involves many collaborators and is very responsive to the needs of a number of clients/stakeholders. The workgroup also agreed that this program is in severe need of a funding increase and that the prospect of the program being eliminated is a significant concern.

Dr. Harding asked for clarification on who in the scientific community is conducting biotechnology food or environmental research. Dr. Best replied that one must look to research across the U.S. borders, such as within OECD. Dr. Blanco added that the work also is ongoing in universities and federal institutions internationally and also at universities across the United States. Dr. Blanco stated that the basic work on biotechnology that was set up by EPA's SAB in 2001 became the framework that is followed throughout the world.

Dr. Harding asked for clarification on whether this program requires more EPA collaboration with others worldwide. Dr. Best responded that it is expected that in the near future there will be more genetic constructs with more gene manipulations and that the workgroup is suggesting that the program accommodate this research. She added that the workgroup agreed that the program is doing a great job collaborating across disciplines.

Dr. Harding asked whether work for LTG 3 had occurred prior to 2003. Dr. Coats stated that poster LTG 3-5 summarized a handful of projects that had been underway prior to 2003. He added that the amount of progress made has produced quite satisfactory work.

Dr. Adams stated that he agreed with the points made. He emphasized that a substantial amount of money is being poured into developing new GM foods, and this will only increase in the future, placing increasing pressure on the environment and human health. He stated that the

Agency's approach is fantastic and that more funds over the next decade will permit EPA to do even more quality work.

Dr. Graham stated that she has a very positive impression of the program from the comments she has heard. Dr. Di Giulio noted that he also was very impressed with the work. He asked whether other organizations are studying gene flow as EPA is through its Gene Flow Project (poster LTG 3-3) in natural plant communities. Dr. Coats responded that other organizations in the United States are not conducting this type of work.

Dr. Adams asked how much EPA is tapping into the work happening in the EU and elsewhere. Dr. Best responded that a considerable amount of research is occurring worldwide, but it would be good to obtain more information on this fact. Dr. Di Giulio asked for clarification on whether the gene flow research in natural plant communities is occurring in the EU. Dr. Adams stated that he believes that to be the case. Dr. Coats pointed out that the work is occurring in several places internationally, including England, Germany, and Indonesia. Dr. Adams stated that EPA must identify the data gaps on research occurring in the EU versus in the United States.

Dr. Harding asked Dr. Francis to provide clarification on this topic.

Dr. Francis explained that the USDA, through its Cooperative State Research, Education, and Extension Service, offers grants in the area of gene flow and gene transfer. She mentioned that there are a number of interagency working groups and one group, the Agricultural Biotechnology Risk Analysis Research Task Group, developed a report on all of the research that is happening in the other agencies in agricultural biotechnology risk assessment. (The report is entitled: "Agricultural Biotechnology Risk Analysis Research in the Federal Government: Cross Agency Cooperation.") She added that this type of document is one way to keep track of the work that the United States is producing and to not duplicate the work of other agencies. In addition, EPA organizes an annual meeting of the United States–European Commission Task Force on Biotechnology Research to help better understand the research ongoing worldwide. The meeting includes mainly senior-level staff from the federal agencies, with usually 100 participants. Dr. Adams asked whether the focus is on new biotechnology in crops, the human health and environmental factors, or a combination of both. Dr. Francis responded that the definition of biotechnology is very broad and this is reflected in the meeting topics covered, including transgenic animal work and also computation biology research beyond work on the conventional crops.

Dr. Harding stated that it would be helpful for the Subcommittee to view the Agricultural Biotechnology report to help answer the questions that have arisen regarding the types of research that are underway. It also would address an earlier point about filling in research gaps, she added. Dr. Francis stated that she would find out if the report could be released.

Dr. Blanco gave the example of research from the University of California about 5 years ago that found contamination of corn in Mexico by transgenic corn produced in the United States. The findings were published in *Nature* and made newspaper headlines; they also spurred a joint task force a few years later to examine the issue of gene flow crossing international boundaries. Another notable example of biotechnology research was research conducted with pollen from Bt corn that was fed to monarch butterflies. Dr. Blanco explained that the work of a task force led by the Entomological Society of America and EPA resulted eventually in industrial withdrawal

of a variety of corn from the market. As a third example, Dr. Blanco mentioned that a researcher who 10 years ago predicted that resistance to Bt crops would occur in 3 years' time now states that he is unsure of what went wrong with his prediction but that resistance is not occurring. It is typical, Dr. Blanco added, that whoever says anything negative about biotechnology immediately makes the front page of newspapers and that there is an instant reaction by multitask, multi-agency bodies to address that topic.

Dr. Blanco recalled that 3 years ago EPA organized a meeting about biotechnology that included a presentation by a researcher who had screened for and found a variety of peanut plant from Peru that lacked the pathway to produce allergenic protein. He also determined how to silence the gene that produced that protein. As soon as industry learned that the product of this research was genetically modified, it lost interest in the findings.

Dr. Harding commented that these examples speak to the fact that the field is an evolving science and involves some uncertainty. She asked if other Subcommittee members had any further comments.

Dr. Ryan stated that he did not make specific comments on the work under LTG 3 but that the workgroups are looking for excellence and the gene flow paper that was presented and the information in the lay literature attests to the high caliber of work.

Dr. Ault commented that his impression from the posters is that very little is known about the pathways associated with allogenic and related effects, which he finds troubling. He also did not see a level of coordination, such as with USDA, on the partitioning and prioritization of research. A third observation, Dr. Ault continued, is that the power curve is very low for this research. The United States is a leader in global production of GM crops, he added, but not enough scientific knowledge is being generated on the effects of these crops; this needs to be remedied.

Dr. Harding emphasized that the Subcommittee report should make strong statements about this topic as well as offer recommendations, such as approaching Congress to provide more funds. She asked the Subcommittee members where they stand with regard to the rating for LTG 3.

Ms. Drumm reminded the Subcommittee that if any additional information is needed, it can be obtained and later considered in another conference call, prior to the conference call already slated for the finalization of the draft report. Drs. Harding and Adams agreed with this plan.

Dr. Francis explained that at the time of the first meeting to plan the SP2 Research Program, it was clear that no other organizations were working on the idea of what causes allergenicity as it is related to GM crops. That original planning meeting included representation from FDA, the National Institute of Allergy and Infectious Diseases (NIAID), USDA, USAID, and OSTP. She explained that EPA had attempted for years to receive funding support from the other agencies to issue a joint RFA to study food allergens but was not successful. NIAID did offer, however, to look at the projects that passed the EPA peer review process and then determine if it could help fund the work. As it turned out, all of the projects that EPA could support did pass the peer review process. Nonetheless, Dr. Francis added, NIAID, as well as USDA and FDA, continue to be silent partners when EPA holds its grantee meetings.

Dr. Harding asked Dr. Blanco for his rating of the work under LTG 3, along with supporting examples.

Dr. Blanco stated that the posters displayed excellent work. He agreed with Dr. Ryan's assessment of the gene flow work (poster LTG 3-3) as being outstanding. Another example of exemplary work, Dr. Blanco stated, is poster LTG 3-4, for which there is an associated patent.

Dr. Coats agreed, adding that the concerns that the workgroup has had are based on a matter that is separate from the quality of the work that has been achieved. Dr. Best pointed out that she still feels insecure about the program for the near future because of the various limitations that have been discussed, but she agreed that the quality of the work now is exceptional. Dr. Adams also agreed with the comments made and stated that the concerns are being addressed through the Subcommittee's recommendations to EPA.

Dr. Ault commented that he still has trouble viewing the LTG 3 program as exceptional. He views the program as less mature than the others and noted that some of its publications were not remarkable. He added that the program needs the time to be strengthened. Dr. Graham pointed out that it is important to note that the size of a program should not be factored into the rating. A smaller program can still meet all of its goals and be exceptional, and despite its size, it might have fewer or more goals than a larger program. Dr. Ault clarified that he did not have a negative impression of the work and it is at the level of what needs to be done, but that more time is required for the program to mature.

Dr. Harding asked for clarification on how appropriate the science is to achieve LTG 3. She stated that the research accomplished so far is very good and the right questions are being asked, but perhaps the work is not at the same level of achievement as it is for LTG 2. Dr. Adams commented that if the program meets its three APGs (Table 3, page 59, MYP), then that would be a significant achievement, but as others have pointed out, EPA might not have sufficient resources to achieve those goals.

In relation to the maturity aspect, Dr. Ryan gave the analogy that the LTG 3 program "is like a 7-year-old child doing high school algebra," whereas the other programs "are like senior scientists doing National Academy work." Thus, he explained, the program is exceptional but it is at an early stage relative to the other programs. Dr. Blanco added that the program is in its infancy and is doing a fine job, but is underfunded.

Dr. Adams asked whether the ratings given by this Subcommittee will influence the resource allocation to the programs. For example, will the rating of "exceeds expectations" or "exceptional" be translated into increased funds? Dr. Harding responded that it is not up to the Subcommittee to project how the draft report will be used in terms of finances. Rather, the group needs to focus on the charge questions, provide evidence to support the ratings, and make recommendations.

Dr. Best asked how often BOSC reviews occur because there is concern that LTG 3 is not receiving enough funding and may not meet its milestones in the near future. Dr. Harding responded that there will be a mid-cycle program review in about 2 years. Ms. Kowalski added that another full review will follow the mid-cycle review to assess the progress made.

Dr. Di Giulio stated that it would be helpful to have a more complete listing of the publications or submitted publications that are affiliated with LTG 3 and also to know what was achieved in the biotechnology research area prior to the program's inception in 2003. Dr. Francis noted that information on research prior to 2003 is summarized in the Accomplishments section (Appendix VI) of the MYP.

Dr. Adams commented that the second APG for LTG 3 (Table 3, page 59, MYP) might sound ambiguous where it mentions "ensure improved capability." He suggested that this APG might be reworded to state specifically what is anticipated from the program. Dr. Di Giulio responded that the decision on this point likely could wait until the next conference call, after the Subcommittee has received more information.

Dr. Adams asked for examples of where LTG 3 is exceeding its goals. Dr. Harding responded that the gene flow research and the remote sensing study are exceptional. She added that the Subcommittee is trying to determine whether LTG 3 can be rated as "exceeds expectations" or as "exceptional" and the report can mention this. She noted that the Subcommittee could delay rating LTG 3 until the next conference call, when it will be better prepared to do so.

After confirming that the Subcommittee members did not need to review LTG 1, Dr. Harding asked Dr. Ryan to lead the discussion on coordination and communication.

Coordination and Communication

Dr. Ryan began the discussion by reading the factors that the Subcommittee was asked to consider in relation to the topic of coordination and communication (page 5, draft charge). The program should be designed to convey information through various parts of the Agency, other offices, the regions, other governmental agencies, and the public at large. Dr. Ryan explained that the meeting so far has touched on coordination and communication points, including a number of details raised by Dr. Francis (e.g., workshops, creation of a Web site, improving input from the regions, etc.) Dr. Ryan stated that he has observed collaborative efforts among the various research groups within the SP2 Research Program. What is lacking, however, is a full explanation of the points that Dr. Francis mentioned. Dr. Ryan noted that Dr. Francis also discussed future steps that need to be taken, including an emphasis on reaching out to other agencies. He stated that the documents that were reviewed did not stress these points. What is needed, he suggested, is a statement saying that communication is an important part of the dissemination of the science.

Dr. Di Giulio commented that he would have liked to have seen more collaboration among some of the laboratories, such as between the ecology and health laboratories. He added that there should be more interconnectedness between universities. Dr. Ryan also would have liked to have seen more interaction across laboratories and scientists, as well as having the work disseminated to both the scientific and lay communities.

Dr. Graham suggested that it might be useful to have a conference call with Dr. Zenick. She noted that one of the posters discussed fish metabolism (i.e., fish physiologically based PK [PBPK]), and the investigators had related information on existing human PBPK work to their ecology study. Dr. Harding proposed that EPA collaborate more with laboratories outside of the Agency that have particular expertise, such as PBPK research.

Dr. Ault suggested that more internal symposia and one-to-one communication are needed, as is the creation of a workshop environment, particularly between the analysts and the empiricists. He also suggested that EPA facilitate a systems line of thinking to improve communication and create better linkages.

Dr. Harding suggested that it would have been beneficial to include the regional perspective of the SP2 Research Program in the current program review. She explained that although the main client is OPPTS, research is done at some point at the local level. Dr. Harding noted that previous program reviews have included evidence or testimonial from regional staff; there was no decision, however, to have this same inclusion for the current BOSC review.

Dr. Graham commented about the coordination that results from ORD's planning process. She mentioned that the role of NPD involves considerable coordination among a team of people from different levels of the Agency. Dr. Graham pointed out that having MYPs also represents a substantial amount of planning and coordination. She commended the effort that is being made in attempting to plan the RFAs in concert with the laboratory-based programs. Dr. Graham added that she was pleasantly surprised to learn of the coordination between laboratory staff, between laboratories, and so on, from the posters.

Dr. Blanco commented that it is important when organizing a meeting to include EPA staff or a scientist or individual who can speak on behalf of EPA. He added that involving the EPA perspective adds cohesiveness to the group and also provides a great deal of interest.

Ms. Drumm stated that she has copies of the Agricultural Biotechnology report requested earlier by the Subcommittee. Ms. Kowalski commented that any documents that are reviewed by the Subcommittee must be made publicly available and because that report is not for distribution, the Subcommittee will not be able to view it. Dr. Francis stated that she is uncertain when the report will be released, but once it is, the Subcommittee members will receive a copy.

General Report Out

Dr. Harding began this last portion of the meeting by indicating that the comments being made are preliminary. She noted that a conference call is to be scheduled for March and another for April.

During this report out session, Drs. Harding and Ryan read the summary assessments that were provided by each of the workgroups. Dr. Harding read the assessments from LTGs 1 and 3, as well as the assessment on scientific leadership. Dr. Ryan read the summary assessment for LTG 2 and the summary for coordination and communication.

Following the report out, Dr. Harding thanked Dr. Francis for her helpful responses during the program review and extended her appreciation to all members of the Subcommittee and everyone else involved with organizing the review.

Adjournment

The meeting adjourned at 12:15 p.m.

Action Items

- ✧ Each Subcommittee workgroup is to provide a longer version of their summary assessment and e-mail it to Drs. Harding and Ryan, who will then compile all documents into one report. The report may not be ready before the next conference call. The workgroups are requested to provide their portions in 2 weeks' time if possible.

- ✧ The individuals who nominated the examples of exceptional work for LTG 1 will provide a couple of sentences as rationale for their nomination to Dr. Graham.

- ✧ Dr. Graham will prepare a summary paragraph that addresses the three questions on page 6 of the draft charge. She will follow this paragraph with the four examples of exceptional work under LTG 1.

- ✧ The Subcommittee will be provided with a more complete listing of the publications affiliated with LTG 3.

- ✧ The Subcommittee will delay rating LTG 3 until the next conference call.

- ✧ Dr. Francis will find out when the report entitled "Agricultural Biotechnology Risk Analysis Research in the Federal Government: Cross Agency Cooperation," will be released, at which point the Subcommittee members will be provided with a copy.

- ✧ The next conference call is slated for March 22, 2007, followed by a call on April 3, 2007.

PARTICIPANTS LIST

Subcommittee Members

Anna K. Harding, Ph.D., Chair
Associate Professor
Department of Public Health
Oregon State University
309 Waldo Hall
Corvallis, OR 97331-6406
Telephone: 541-737-3830
E-mail: anna.harding@oregonstate.edu

P. Barry Ryan, Ph.D., Vice-Chair
Professor
Department of Environmental and Occupational Health
Rollins School of Public Health
Emory University
Grace Crum Rollins Building, Room 264
1518 Clifton Road, NE
Atlanta, GA 30322
Telephone: 404-727-3826
E-mail: bryan@sph.emory.edu

Craig Adams, Ph.D.
Professor
Department of Civil, Architectural and Environmental Engineering
University of Missouri-Rolla
220 Butler-Carlton Hall
1870 Miner Circle
Rolla, MO 65409
Telephone: 573-341-4041
E-mail: adams@umr.edu

Jerald S. Ault, Ph.D.
Associate Professor
Rosenstiel School of Marine and Atmospheric Science
University of Miami
4600 Rickenbacker Causeway
Miami, FL 33149
Telephone: 305-361-4884
E-mail: jault@rsmas.miami.edu

Elly P.H. Best, Ph.D.
Research Biologist
Environmental Processes and Engineering Division
U.S. Army Engineer Research and Development Center
3909 Halls Ferry Road
Vicksburg, MS 39180-6133
Telephone: 601-634-4246
E-mail:
elly.p.best@erdc.usace.army.mil

Carlos Blanco, Ph.D.
Research Entomologist
U.S. Department of Agriculture
Agricultural Research Service
141 Experiment Station Road
Stoneville, MS 38776
Telephone: 662-686-5275
E-mail:
cblanco@msa-stoneville.ars.usda.gov

Joel R. Coats, Ph.D.
Professor
Department of Entomology
Iowa State University
Insectary Building
Ames, IA 50011
Telephone: 515-294-4776
E-mail: jcoats@iastate.edu

Richard T. Di Giulio, Ph.D.
Professor
Nicholas School of the Environment and Earth Sciences
Duke University
Levine Science Research Center, Room A346
Research Drive
Durham, NC 27708-0328
Telephone: 919-613-8024
E-mail: richd@duke.edu

DRAFT

Judy Graham, Ph.D.
Senior Director and Senior Scientist
American Chemistry Council
1300 Wilson Boulevard
Arlington, VA 22209
Telephone: 703-741-5229
E-mail:
judy_graham@americanchemistry.com

Designated Federal Officer

Heather Drumm
U.S. Environmental Protection Agency
Office of Research and Development
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Mail Code: 8104R
Washington, DC 20460
Telephone: 202-564-8239
E-mail: drumm.heather@epa.gov

EPA Participants

Elaine Francis, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Research
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Mail Code: 8701F
Washington, DC 20460
Telephone: 202-343-9696
E-mail: francis.elaine@epa.gov

Robert Frederick, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Research
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Mail Code: 8623N
Washington, DC 20460
Telephone: 202-564-3207
E-mail: frederick.bob@epa.gov

Timothy Gleason, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
Atlantic Ecology Division
National Health and Environmental Effects Research Laboratory
27 Tarzwell Drive
Narragansett, RI 02882
Telephone: 401-782-3033
E-mail: gleason.timothy@epa.gov

Jim Jones
U.S. Environmental Protection Agency
Office of Research and Development
Office of Pesticide Programs
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Mail Code: 7501P
Washington, DC 20460
Telephone: 703-305-7090
E-mail: jones.jim@epa.gov

William Mundy, Ph.D.
U.S. Environmental Protection Agency
Office of Research and Development
National Health and Environmental Effects Research Laboratory
Mail Code: B105-06
Research Triangle Park, NC 27711
Telephone: 919-541-7726
E-mail: mundy.william@epa.gov

Greg Sayles, Ph.D.
U.S. Environmental Protection Agency
26 W. Martin Luther King Drive
Mail Code: 163
Cincinnati, OH 45268
Telephone: 513-569-7607
E-mail: sayles.gregory@epa.gov

DRAFT

Jim Willis
U.S. Environmental Protection Agency
Office of Research and Development
National Center for Environmental Research
Ariel Rios Building
1200 Pennsylvania Avenue, NW
Mail Code: 7405M
Washington, DC 20460
Telephone: 202-564-0104
E-mail: willis.jim@epa.gov

Contractor Support

Deborah Komlos
The Scientific Consulting Group, Inc.
656 Quince Orchard Road, Suite 210
Gaithersburg, MD 20878
Telephone: 301-670-4990
E-mail: dkomlos@scgcorp.com

Meeting Participants

Suzanne Ayvazian
U.S. Environmental Protection Agency

Mace Barron
U.S. Environmental Protection Agency

Charlotte Bercegeay
U.S. Environmental Protection Agency

Sandy Bird
U.S. Environmental Protection Agency

Bryan Boulanger
U.S. Environmental Protection Agency

Christal Bowman
U.S. Environmental Protection Agency

Elizabeth Boykin
U.S. Environmental Protection Agency

Steve Bradbury
U.S. Environmental Protection Agency

Joseph Breier
U.S. Environmental Protection Agency

Pei-Jen Chen
U.S. Environmental Protection Agency

Tim Collette
U.S. Environmental Protection Agency

Alva Daniels
U.S. Environmental Protection Agency

Sally Darney
U.S. Environmental Protection Agency

Allen Davis
U.S. Environmental Protection Agency

Cathy Fehrenbacher
U.S. Environmental Protection Agency

Jessica Flynn
U.S. Environmental Protection Agency

Jack Fowle
U.S. Environmental Protection Agency

Bob Frederick
U.S. Environmental Protection Agency

Andrew Geller
U.S. Environmental Protection Agency

John Glaser
U.S. Environmental Protection Agency

Tim Gleason
U.S. Environmental Protection Agency

Jason Gray
Office of Management and Budget

Jason Grear
U.S. Environmental Protection Agency

Zhishi Guo
U.S. Environmental Protection Agency

DRAFT

Michael Hemmer
U.S. Environmental Protection Agency

Ross Highsmith
U.S. Environmental Protection Agency

Jean Holmes
U.S. Environmental Protection Agency

Rodney Johnson
U.S. Environmental Protection Agency

Phillip Juengst
U.S. Environmental Protection Agency

Bob Kavlock
U.S. Environmental Protection Agency

Rick Kolanczyk
U.S. Environmental Protection Agency

John Kough
U.S. Environmental Protection Agency

Lori Kowalski
U.S. Environmental Protection Agency

Susan Laessig
U.S. Environmental Protection Agency

Chris Lau
U.S. Environmental Protection Agency

Michael Loughran
U.S. Environmental Protection Agency

Bob Luebke
U.S. Environmental Protection Agency

Bob MacPhail
U.S. Environmental Protection Agency

Susan Makris
U.S. Environmental Protection Agency

Mark Mason
U.S. Environmental Protection Agency

Jackie McQueen
U.S. Environmental Protection Agency

Ginger Moser
U.S. Environmental Protection Agency

Diane Nacci
U.S. Environmental Protection Agency

Shoji Nakayama
U.S. Environmental Protection Agency

David Olszyk
U.S. Environmental Protection Agency

Jennifer Orme-Zavaleta
U.S. Environmental Protection Agency

Dale Pahl
U.S. Environmental Protection Agency

Linda Papa
U.S. Environmental Protection Agency

Sissy Petropoulou
U.S. Environmental Protection Agency

Nick Radio
U.S. Environmental Protection Agency

Kathleen Raffaele
U.S. Environmental Protection Agency

Sandy Raimondo
U.S. Environmental Protection Agency

Carl Richards
U.S. Environmental Protection Agency

John Rogers
U.S. Environmental Protection Agency

Bill Russo
U.S. Environmental Protection Agency

Christine Russom
U.S. Environmental Protection Agency

DRAFT

Dee Sailstad
U.S. Environmental Protection Agency

John Sanseverino
The University of Tennessee

Greg Sayles
U.S. Environmental Protection Agency

Pat Schmieder
U.S. Environmental Protection Agency

Nathan Schumaker
U.S. Environmental Protection Agency

Donna Schwede
U.S. Environmental Protection Agency

Jennifer Seed
U.S. Environmental Protection Agency

Deborah Segal
U.S. Environmental Protection Agency

Maryjane Selgrade
U.S. Environmental Protection Agency

Subhas Sikdar
U.S. Environmental Protection Agency

Mark Strynar
U.S. Environmental Protection Agency

Kent Thomas
U.S. Environmental Protection Agency

Hugh Tilson
U.S. Environmental Protection Agency

Barbara Walton
U.S. Environmental Protection Agency

Steve Watkins
U.S. Environmental Protection Agency

Lidia Watrud
U.S. Environmental Protection Agency

Eric Weber
U.S. Environmental Protection Agency

Jeff Welch
U.S. Environmental Protection Agency

Jim Willis
U.S. Environmental Protection Agency

Douglas Wolf
U.S. Environmental Protection Agency

Fred Wright
University of North Carolina–Chapel Hill

Hal Zenick
U.S. Environmental Protection Agency

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APPENDIX A:

Meeting Agenda

B·O·S·C
BOARD OF SCIENTIFIC COUNSELORS

SAFE PESTICIDES/SAFE PRODUCTS (SP2) SUBCOMMITTEE
MEETING AGENDA
February 7-9, 2007

U.S. Environmental Protection Agency
Office of Research and Development
109 T.W. Alexander Drive
Building C - Room C111A, B, C
Research Triangle Park, NC

DRAFT

Wednesday, February 7, 2007

7:30 a.m.	Registration	

Welcome and Overview

8:00 a.m.	Welcome and Opening Remarks	Dr. Anna Harding Chair, SP2 Subcommittee Dr. Barry Ryan Vice-Chair, SP2 Subcommittee
8:15 a.m.	DFO Remarks	Ms. Heather Drumm Designated Federal Official ORD
8:30 a.m.	ORD Welcome	Dr. Elaine Francis Office of Research and Development

SP2 Research Program Long-Term Goal 1

8:40 a.m.	LTG 1: Overview (Subparts A & B)	Dr. William Mundy, NHEERL Office of Research and Development
9:10 a.m.	LTG 1: Poster Session I (Atrium)	
11:10 a.m.	LTG 1: Poster Session I Discussion	SP2 Subcommittee
12:10 p.m.	BREAK	SP2 Subcommittee
12:30 p.m.	Working Lunch: Subcommittee Working Time	

1:00 p.m.	LTG 1: Overview (Subpart C)	Dr. Greg Sayles, NHSRC Office of Research and Development
1:30 p.m.	LTG 1: Poster Session II (Atrium)	
3:00 p.m.	LTG 1: Poster Session II Discussion	SP2 Subcommittee
3:30 p.m.	Subcommittee Working Time	SP2 Subcommittee
4:00 p.m.	OPP Perspective of ORD's SP2 Research	Mr. Jim Jones, Director Office of Pesticide Programs OPPTS
4:45 p.m.	Adjournment	

Thursday, February 8, 2007

8:30 a.m.	Review of Yesterday's Activities Overview of Today's Agenda	Dr. Anna Harding Chair, SP2 Subcommittee

SP2 Research Program Long-Term Goals_2 & 3

8:45 a.m.	LTG 2: Overview	Dr. Timothy Gleason NHEERL Office of Research and Development
9:15 a.m.	LTG 2: Poster Session (Atrium)	
10:45 a.m.	LTG 3: Overview	Dr. Robert Frederick, NCEA Office of Research and Development
11:15 a.m.	LTG 3: Poster Session (Atrium)	
12:00 p.m.	Lunch	
1:00 p.m.	LTGs 2 & 3: Poster Session Discussion	SP2 Subcommittee
2:00 p.m.	Subcommittee Working Time	
2:30 p.m.	OPPT Perspective of ORD's SP2 Research	Mr. Jim Willis, Director Chemical Control Division Office of Pollution Prevention and Toxics OPPTS

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3:15 p.m.	Preliminary Subcommittee Discussion of Charge Questions/Rating of LTG 1	SP2 Subcommittee
4:00 p.m.	Public Comment	
4:15 p.m.	Adjournment	

Friday, February 9, 2007

8:00 a.m.	Preliminary Subcommittee Discussion of Charge Questions/Rating of LTGs 2 & 3	SP2 Subcommittee
8:45 a.m.	Working Time for Subcommittee	SP2 Subcommittee
11:00 a.m.	General Report Out	Dr. Anna Harding Chair, SP2 Subcommittee
12:00 p.m.	Adjournment	

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